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Amateur Radio

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NOVEMBER 1995

CQ

1945 CQ 1995
50th Anniversary

In This Issue

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- 1995 Young Ham Of The Year, Adam Weyhaupt, N9MEZ
- Build A 15 Meter QRP Novice Transceiver
- W6SAI Revisits The Collins 30L-1 Amplifier
- CQ Reviews: Kenwood's TS-870S

WA1TKH (left), Andrew, KB1AER, & Donna, N2FFY

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THE RADIO AMATEUR'S JOURNAL

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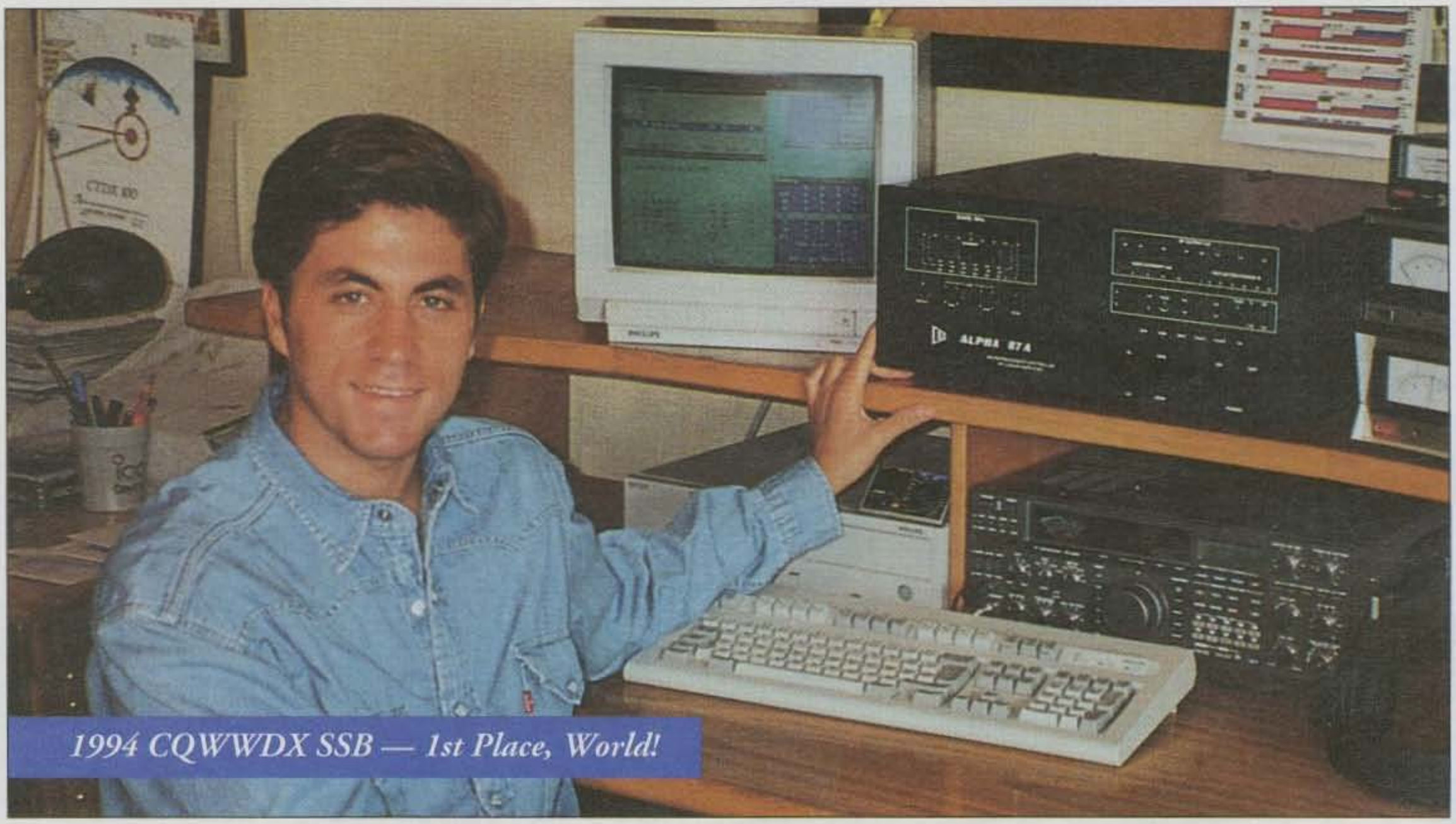

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CQ The Radio Amateur's Journal

ON THE COVER: One of the greatest strengths of the ham radio community is the diversity of its membership. Pictured here are Bob Wilson, WA1TKH, Andrew Losee, KB1AER, and Donna Knauer, N2FFY. (Photo by Larry Mulvehill, WB2ZPI)

NOVEMBER 1995 **VOL. 51 NO. 11**

FEATURES

DEPARTMENTS

ZERO BIAS

AN EDITORIAL

It used to be that Thanksgiving and the CQ WW DX CW Contest were the benchmarks to start the official holiday season. If you were inclined to push it a bit, then you might have used Halloween and the CQ WW DX SSB Contest.

This year our local Sears store here in Hicksville pushed the season back far enough to coincide with the 162nd anniversary of the birth of our 23rd President, Benjamin Harrison, and the SEANET '95 SSB Contest (on August 20, 1995). Even for a confirmed materialist like me, that's too early to have to start looking at row upon row of Christmas decorations and animated figures.

Being a traditionalist, this is the month in which dreams begin to take shape, wish lists are started, and hopes are either fulfilled or dashed in the CQ WW DX CW Contest. This is the month—the official month—in which Bill Welsh, W6DDB, and Dave Ingram, K4TWJ, start to run their lists of goodies for the ham shack, and we try to fit in a number of product reviews so that all of us have a good selection of potential gifts this holiday season. I don't mean to take away from the SEANET Contest, nor do I mean any disrespect to the memory of President Harrison, but somehow there is a right and proper time to celebrate.

I began to think that there might be more to Sears's thinking than simple greed and avarice. It's pretty obvious that we have to get through Halloween and Thanksgiving before we get to "the biggies," and these two are not particularly gigantic buying periods wherein people exchange gifts of celebration. I don't know about your family, but my family never celebrated President Harrison's birthday. So maybe there was something else happening worthy of celebration that Sears knew and we didn't. It took a while to figure out what it might be, and if that's the case, then everyone does have or should have reason to stretch out the season a bit. It's fairly simple and has nothing to do with Presidential birthdays or amateur radio contests (well, not right away).

The happy occasion, and the reason to celebrate, occurred on August 12, 1995, when astronomers at the California Institute of Technology's Big Bear Solar Observatory saw the first sunspot in the new sunspot cycle. Cycle 23 has officially begun, almost a year earlier than predicted. In fact, if the new cycle accelerates as fast as Cycle 22, we might see a solar maximum by the end of 1998. This means we can expect to see larger scores and greater participation in the 1996 contest season, and a lot of the DX return to the HF bands. We can also expect that those of us on the east coast will stand a better chance of working Scarborough Reef the next time around. Joe Lynch, N6CL, has complete details of the announcement in his column this month.

To most amateurs this is perhaps one of the best holiday gifts and reasons to celebrate there is. It's all coming back faster and better than anyone thought. If you have one of the No-Code licenses, now is definitely the time to add some code tapes to your holiday wish list and achieve that 5 wpm level. Forget emotional satisfaction. There's a tremendous amount of DX you can work on 10 meters, and any one of the DX contests can get your adrenalin flowing. If you missed any of the great times of the last cycle, you've got plenty of time now to prepare for the new one. There are no excuses for not having fun.

If you're the kind of amateur who looks at *CQ's Radio Classics Calendar* as sort of a wish list of gear to trade up to, forget Cycle 23, as there's nothing there for you to get excited about. You might as well stop hanging out at your mailbox waiting for the new *Walter Ashe Catalog* to arrive. I won't tell you why, but trust me; it's not good news. The rest of us have quite a lot to look forward to, prepare for, and most certainly enjoy. In less time than it took to get a card from Box 88, the world will be a small place again.

Okay, so maybe Sears had a point in starting to push the season in August after all. Maybe a few power tools would be just the right thing to use to build a new operating desk, a few shelves, or for the really fortunate few, a complete new shack. Maybe it was simply greed and avarice on their part, but it served to shift the focus from what is to what is going to be, and that's good news for all of us. It's perhaps something more to be thankful for on a personal level this Thanksgiving.

We're all going to need some new stuff for the new cycle now that it has started. If you're the kind of person who needs a reason or a rationale for something new, you've got it. If you're like the rest of us who don't particularly need a reason, you now have one that will make sense to the rest of your family. We're all covered this time. Always remember that most of us came into this hobby to enjoy ourselves and to improve the quality of our lives. Most of us have succeeded at that.

We Came Through (Again)

This editorial is being written towards the end of September, when the memories of the horrendous fires here on Long Island and the devastating hurricane damage throughout the Caribbean are quite fresh in my mind. In both instances amateurs came forth to provide communications and to give the outside world the details of what was happening. CNN had reports from two amateurs in the Caribbean describing what was going on and what they could see from their particular vantage point. The regular and commercial communication systems were nonexistent, having been destroyed by the storm. On Long Island amateurs quickly organized to provide all sorts of emergency communications quickly and efficiently.

While this once again points out the value of amateur radio and the altruism of our fellow amateurs, it also once again points out the failings of many civil emergency systems. While I take great pride in the accomplishments of my fellow amateurs, I can't help but wonder why people never seem to question why systems put in place by local authorities traditionally fail, are inadequate, or are never changed due to previous experience. It's amazing that no one finds it odd that amateurs with far less money invested in hardware can continually come through in a pinch and save the day. I'm glad that we can, and I know that we can do it each and every time we're called upon. It's still amazing.

Some time ago I wrote about my experiences with one local municipality where I tried to straighten out their communications system, stay within a budget, and provide extra emergency preparedness. To say that it turned into a fiasco is putting it mildly. With most municipalities one has to put up with political appointees, nepotism, and a number of people who haven't the slightest idea what the requirements are; and needless to say, they have never been in the position of having to use and rely on the equipment. I can only assume that the situation is more typical than just my isolated experience.

It seems that wherever tragedy strikes, the backbone of emergency traffic is handled, and exceptionally well, by amateurs. While our budgetary constraints are certainly greater, we do have a way of seeing the problem, coming up with workable solutions, and most of all, achieving the goal. The concepts are not that difficult. Amateurs seem to be able to do it on a regular basis, anywhere in the world, seemingly effortlessly, with style and grace. We know it's not easy nor simple, but the big secret is that we know it can be done.

Heterodoxy

The circle of wagons was drawn a bit tighter this summer when it was announced that the Military Affiliate Radio System (MARS) will cease using CW as a mode of communication for Department of Defense MARS traffic as of October 1, 1996. CW will be retired in favor of more modern digital modes. I'm sure many brasspounders pounded the table when they heard the news.

When I reported on the Coast Guard's ceremonious ending of CW transmissions in our June issue, I really didn't think or expect that the second knell would follow as quickly. Some of the mail I received in reference to that editorial staunchly defended the use of CW at sea and commented on its continued use by some shipping lines and foreign countries. Yes, I know all of that is true, just as sure as I know that the end of an era is in sight. CW simply will evolve into another mode which one can elect to use or not, having no emotional baggage other than personal satisfaction.

CW is not dead, nor will its use die out in the near future. However, its days as a requirement evidently are numbered. This will happen in spite of, and not particularly as a result of, what any individual or group advocates. Some may yell, kick, and scream, but that really won't change the outcome. We can draw those wagons into tighter and tighter circles. It's easy, as each year there are fewer and fewer wagons. We are witnessing a fundamental change in attitude and philosophy with regard to technology and purpose. That thinking has already spread to amateur radio.

73, Alan, K2EEK

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ANNOUNCEMENTS

• **Superbowl XXX at Phoenix**—Amateurs coming to Phoenix in January 1996 for the Superbowl are offered the use of local repeaters and autopatches by the Arizona Repeater Association, Inc. (ARA). Any licensed amateur sending a #10 SASE to The ARA, P.O. Box 35758, Phoenix, AZ 85069-5758, will be sent a repeater listing with PL and autopatch instructions.

• **The following Special Events are scheduled for November:**

K2GQ, from New Jersey; the Irvington-Roseland Amateur Club; to commemorate the club's 50th anniversary; 1400–2100Z Nov. 11–12; operation in the General portion of 80–15 meter bands and Novice portion of 10 meters and on 146.52 FM. For certificate send QSL and SASE or 1 green stamp to Bill Fitzsimmons, N2LMU, 102 Cedar Hill Avenue, Belleville, NJ 07109.

WD4JDB, from the 7th Annual Jack Daniel's World Championship Invitational Barbecue, Lynchburg, Tennessee; Alabama Goodtime Gang; 1200–0000Z Oct. 28; operation on 15 and 20 meters, Novice phone 10 meters, packet 145.010. For certificate send 9 × 12 SASE to AGTG, P.O. Box 1624, Anniston, AL 36202.

KQ4UW, from the official opening of the Bailey-Mathews Shell Museum on Sanibel Island (IOTA NA069), a barrier island off the southwest coast of Florida; The Sanibel Amateur Radio Emergency Unit; 1400Z Nov. 18 to 2100Z Nov. 19; operation in the lower portion of the HF General 40, 20, 15 and Novice 10 meter phone bands. For QSL and certificate confirmation send QSL and 9 × 12 SASE to Jerry Deutscher, KQ4UW, 802 Elinor Way, Sanibel, FL 33957.

KR4CW, from the Army MARS station, Fort Knox, Kentucky; to honor those who have served our country; Lincoln Trail ARC; Nov. 11 and 12; in the Novice area of 10 meters and the General area of 15, 40, 80 meters, both SSB and CW. Send QSL and SASE to LTARC, P.O. Box 342, Vine Grove, KY 40175, for an 8-1/2 × 11 color certificate.

WB5MII, from Veteran's Day commemoration, VA Hospital, Albuquerque, New Mexico; The Albuquerque ARC; 1600Z Nov. 11 to 1600Z Nov. 12; on 15, 20, and 40 meters in the General phone subbands. For certificate, send SASE to AARC, P.O. Box 11853, Albuquerque, NM 87192.

KC5PCN, from the beach at the mouth of the Rio Grande River, Boca Chica Beach, Texas; Brownsville Charro ARC; to celebrate the return of Snowbirds to the Rio Grande Valley; Nov. 4 and 5; operation in the General portions of the 40, 20, and 15 meter phone subbands and Novice 10 and 6 meter phone subbands. Send QSL and SASE to Charro, Box 8610, Brownsville, TX 78526.

KA5LMZ, from The Eddy County Search and Rescue Group Hunter Rescue Station in the Guadalupe Mountains, Lincoln National Forest, Carlsbad, New Mexico; 1600Z Nov. 5 to 0100Z Nov. 6; in the General portion of the 80 to 10 meter phone bands. For QSL, send SASE to Jackie Price, KA5LMZ, 1412 Maple Street, Morgan City, LA 70380.

K2BSA/6, from the "World's First Lodgepole & Rope Lashed Wooden Antenna Tower;" Camp Pendleton Marine Base, California; The Boy Scouts of America Orange County Jubilee; Nov. 9–12; operation on 3.740, 7.29, 14.290, 18.140, 28.990, 28.350 MHz. QSL and certificate of the World's First BSA Lodgepole Tower. Send QSL and 9 × 12 (for flat) or #10 (for folded) SASE to: K2BSA/6 c/o Mel Goldberg, Troop 319, 8341 Hurstwell Drive, Huntington Beach, CA 92646.

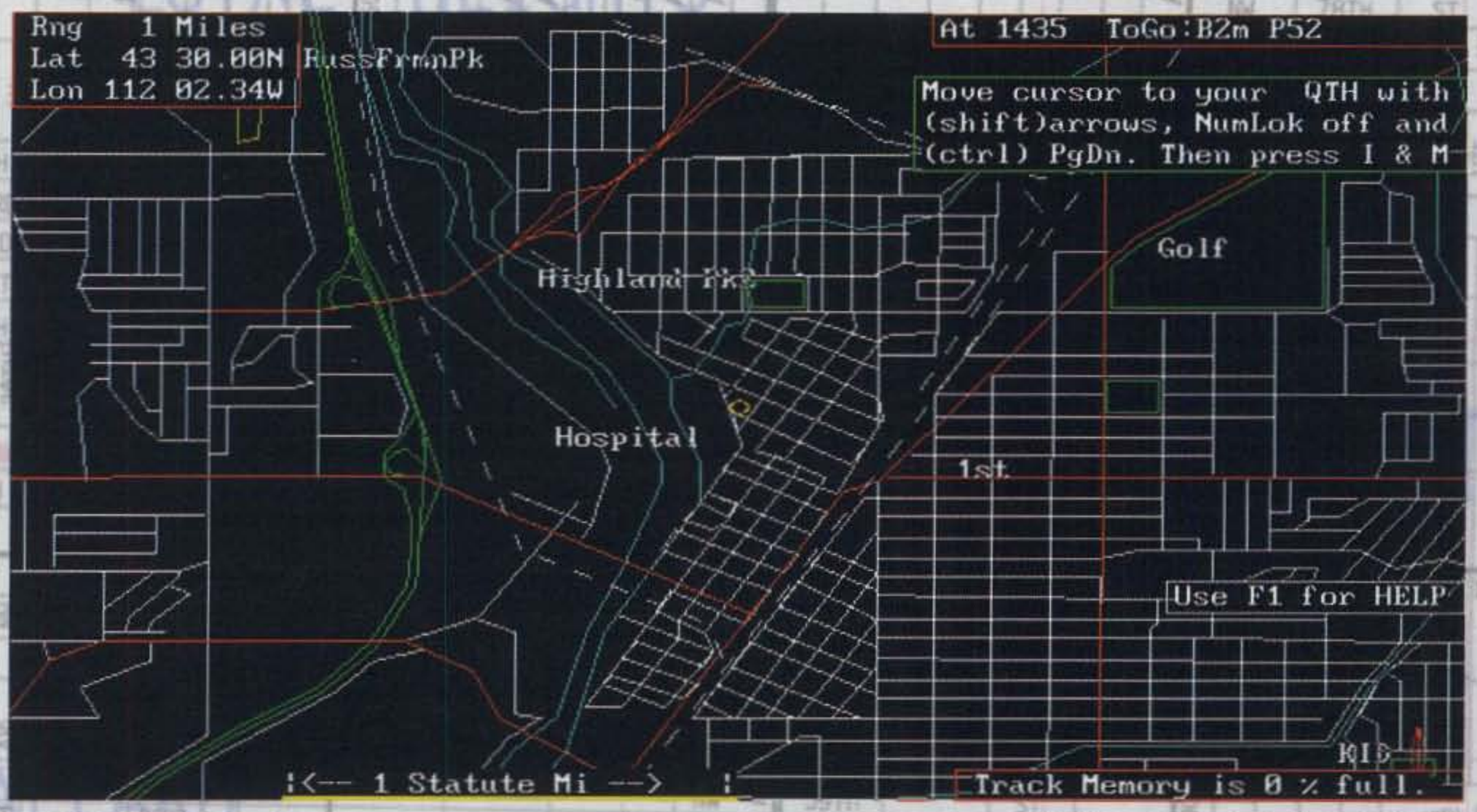
K6BIQ, from emergency preparedness station, Black Butte Lake, Glenn County, California; The Glenn County RACES; 1400Z Nov. 11 to 0500Z Nov. 12; on 7.125 ±20 kHz on the hour for CW and 7.250 ±20 kHz on the half hour for phone. Other frequencies will be 432.1 USB, 144.2 USB, and 147.105 and 444.2 simplex or repeater. For certificate, send SASE to Glenn County RACES, P.O. Box 94, Willows, CA 95988.

7-land, from Iron Mission State Park; Cedar City, Utah; to commemorate the 144th anniversary of the first Pioneer Iron Works in the Rocky Mountains; 1500–2400Z Nov. 10 & 11; operation on 3.951, 7.251, 14.251, 21.351, and 28.351 (±QRM). For 8 × 11 certificate, send 9 × 12 SASE to Richard Parker, KI7DF, 4410 N. Apple Blossom Lane, Cedar City, UT 84720.

W8ZHO, aboard the *USS Silversides* Maritime Museum, Muskegon, Michigan; The Muskegon Area Amateur Radio Council; 1800Z Nov. 4 through 1200Z Nov. 5; anywhere in the General portion of the 40 and 20 meter bands, both phone and CW. To receive certificate, send SASE to Robert Carter, WB8OQT, P.O. Box 691, Muskegon, MI 49443.

KBØISS, from the Ensor Farmsite and Amateur Radio Museum, Olathe, Kansas; Santa Fe Trail

See where all the Packet users are headed



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AEA PK-12

It is easy to see where Packet users are headed when you take a look at the PK-12, AEA's 1200 bps, VHF/UHF Packet TNC.

The GPS firmware and included Automatic Packet Reporting System (APRS™) software allow you to receive and transmit position information. The PK-12 is GPS, Loran, ARNAV, and ULTIMETER II compatible. If your computer has limited COM ports, get AEA's optional APRS Adapter Cable shown below and connect your GPS receiver and PK-12 to one COM port.

Gateway firmware lets the PK-12 work as a node for faster throughput and increased channel efficiency. Three users can use your PK-12 as a Gateway, you can communicate with another station, someone can be leaving you a message in your Mailbox, and others can be digipeating through your TNC—all at once.

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Optional APRS Adapter Cable lets you save a COM port on your computer when running APRS software.

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Connect with us

ARC; 1500–2200Z Nov. 4; operation on 7.260 and 14.260. For certificate, send QSL and 9 × 12 SASE to David Hueben, KBØISS, 9023 Outlook, Overland Park, KS 66207.

VG3W, from the McCrae House Museum, birthplace of Col. John McCrae, MD, author; Guelph, Ontario; to commemorate the 80th anniversary of the writing of his poem "Flanders Fields," and the 50th anniversary of the liberation of Europe in WWII; The Guelph ARC; 1500–2200Z Nov. 6–9; on all bands. QSL via VE3ZM, Guelph ARC, P.O. Box 1305, Guelph, Ontario, Canada N1H 6H9 with Canadian postage, 1 IRC, or one green stamp.

• The following hamfests, etc., have been slated for November:

Nov. 4, **Lake County Hamfest & Electronic Expo**, Lake County Fairgrounds, Eustis, Florida. Contact Tony Summerlin, KE4NLG, 9205 Fernery Road, Leesburg, FL 34788; phone 904-787-1449. (Exams.)

Nov. 4, **West Palm Beach ARC Free Flea**, John Prince Park, Lake Worth, Florida. Contact Marvin Kaskawits, KD2CK@KB4VOL; telephone 407-683-2930; p001471b@pbfreenet.seflin.lib.fl.us

Nov. 4, **6.91 Friendly Fest**, Waukesha County Expo Center Arena "Forum," Milwaukee, Wisconsin. Contact Burt, N9VBI, at 414-328-0535. (Exams.)

Nov. 4, **Midwest Amateur Radio Expo**, Lewis and Clark Community College campus, Godfrey, Illinois. For general hamfest info contact Harold, KC9GL, at 618-466-1909; for exam pre-registration and info contact Rich, KF9F, at 618-466-2306. (Exams.)

Nov. 4, **Enid, Oklahoma Hamfest**, Garfield County Fairgrounds Hoover Building, Enid, Oklahoma. Call Tom Worth, N5LWT, at 405-233-8473 (days), or 405-233-8473 (nights). (Exams.)

Nov. 4–5, **Cincinnati Computer Fair**, Cincinnati Gardens, Cincinnati, Ohio. Call 513-263-3378.

Nov. 4–5, **Odessa, Texas Hamfest**, Ector County Coliseum, Exhibit Bldg. B, Odessa, Texas. Contact Robert Jordan, N5RKN, 915-335-7980.

Nov. 5, **Fox Cities ARC Hamfest**, The Starlite Club, Kaukauna, Wisconsin. Write to: FCARC, 2410 E. Newberry Ct., Appleton, WI 54915; or call Dan Vanevenhoven at 414-739-5101.

Nov. 5, **Ham Expo '95**, Huntington Hilton Convention Center, Melville, New York (Long Island). For information, call Ron Katz, WB2DVK, at 516-689-3279 (days); or Emil Tillona, KD1F, at 516-696-0610 (eves). (Exams.)

Nov. 5, **Southfield, Michigan 1995 Swap and Shop**, Southfield-Lathrup High School, Southfield, Michigan. Contact Andy Penn, N8JVA, at 810-559-2442; for exam pre-registration call Jeff Albrecht, N8WRY, at 810-642-3608. (Exams by pre-registration only.)

Nov. 11, **18th Annual Montgomery Hamfest & Computer Show**, Garrett Coliseum at the South Alabama State Fairgrounds, Montgomery, Alabama. Write to Hamfest Committee, c/o 2141 Edinburgh Drive, Montgomery, AL 36116-1313; or phone Phil at 334-272-7980; or fax 334-264-1150. (Exams.)

Nov. 11, **Beachfest '95**, Myrtle Beach High School, Myrtle Beach, South Carolina. Call Les Shattuck at 803-236-3036. (Exams.)

Nov. 11, **Titusville ARC 5th Annual Hamfest**, Fox Lake Park, Titusville, Florida. Contact Cliff Hoag, KC4SYD, 2670 Hutchinson Pl., Titusville, FL 32780 (407-267-7030).

Nov. 12, **SouthCentral Connecticut ARA 16th Annual Flea Market**, Branford Intermediate School, Brandford, Connecticut. For more information or reservations, send SASE to SCARA, P.O. Box 705, Branford, CT 06405-0705, or call Brad at 203-265-9983. (Handicapped accessible; exams.)

Nov. 12, **Carthage ARS Hamfest**, Memorial Hall, Carthage, Missouri. For information, contact Jim Dixon, WXØJ, at 417-358-2761; or write P.O. Box 783, Carthage, MO 64836.

Nov. 18–19, **20th Annual Suncoast Amateur Radio & Computer Convention**, Florida Expo Park Expo Hall, Tampa, Florida. Write to 1556 56th Ave. North, St. Petersburg, FL 33703, or call 813-525-5178.

Nov. 18–19, **Fort Wayne Hamfest & Computer Expo**, Fort Wayne, Indiana. Contact Don Gagnon, WB8HQS, at 219-484-3317; or write to ACARTS, P.O. Box 10342, Fort Wayne, IN 46851. (Exams.)

Nov. 19, **JARSFEST95**, Benson, North Carolina. Contact Bill Lambert, AK4H, 8917 NC 50 N., Benson, NC 27504 (919-894-3352, eves. 7–10 PM). (Exams by preregistration; call 919-847-8512 for info.)

Nov. 19, **Chicago ARC Ham Auction**, DeVry Institute of Technology, Chicago, Illinois. For more information, call 312-545-4740.

Nov. 19, **W.A.COM 8th Annual Tri-State Hamfest & Computer Fair**, Chartiers-Houston High School, Washington, Pennsylvania. Contact Ted Lockman, WB3BZK, at 412-222-6473; or Russ Burhenn, N3NEL, at 412-222-4037; or FAX 412-258-8342; via packet to: Walt Piroth N3BKW@W3CSL.#SWPA.PA.USA.NA. E-Mail: Joe Stout jstout@sgi.net.; or write: W.A.COM, P.O. Box 1386, Washington, PA 15301. (Exams.)

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It's time to clean off the workbench, gather up the parts catalogs, and start planning your time for this great winter project. Not only will you enjoy the hours spent building this QRP project, you will enjoy many more hours and years using it.

How To Build A QRP Transceiver For The Novice 15 Meter Band

BY M. A. (MAC) CHAPMAN*, KI6BP

There is a special thrill in using home-brew gear that makes each contact extra satisfying. If it happens to be a rare call, then it's even better. You don't need high power to work DX. QRP enthusiasts do it daily, and so can you.

The 15 meter band gives Novice stations a chance to work some serious DX. During the day 15 meters has a reliable *F2*-layer, and DXing can last into the early evenings. You often find stations working into Europe at lunch time and into Asia during dinner. In the early summer you can get good north-south trans-equatorial skip sometimes into Antarctica.

The receiver part of this transceiver has a narrow RF stage, a crystal-filtered IF, and knife-edge audio. It has many key features you need to operate on 15 meters. The transmitter portion follows the popular three-stage scheme with multi-section filtering. It has a shaped keyer, TR-switching, and a pin-diode attenuator.

The transmitter and receiver are dual conversion. The receiver starts with a stable low-noise narrow-bandpass front end, and follows this with two active down-converting mixers preceding a crystal-filtered-IF. These active mixers eliminate the need for a second IF amplifier and result in a well-balanced 15 meter receiver.

The transmitter is similar to the receiver. It has a simple crystal oscillator followed by two up-converting mixer stages using the HFO and VFO for beat signal sources. These two oscillator signals are the only common transceiver

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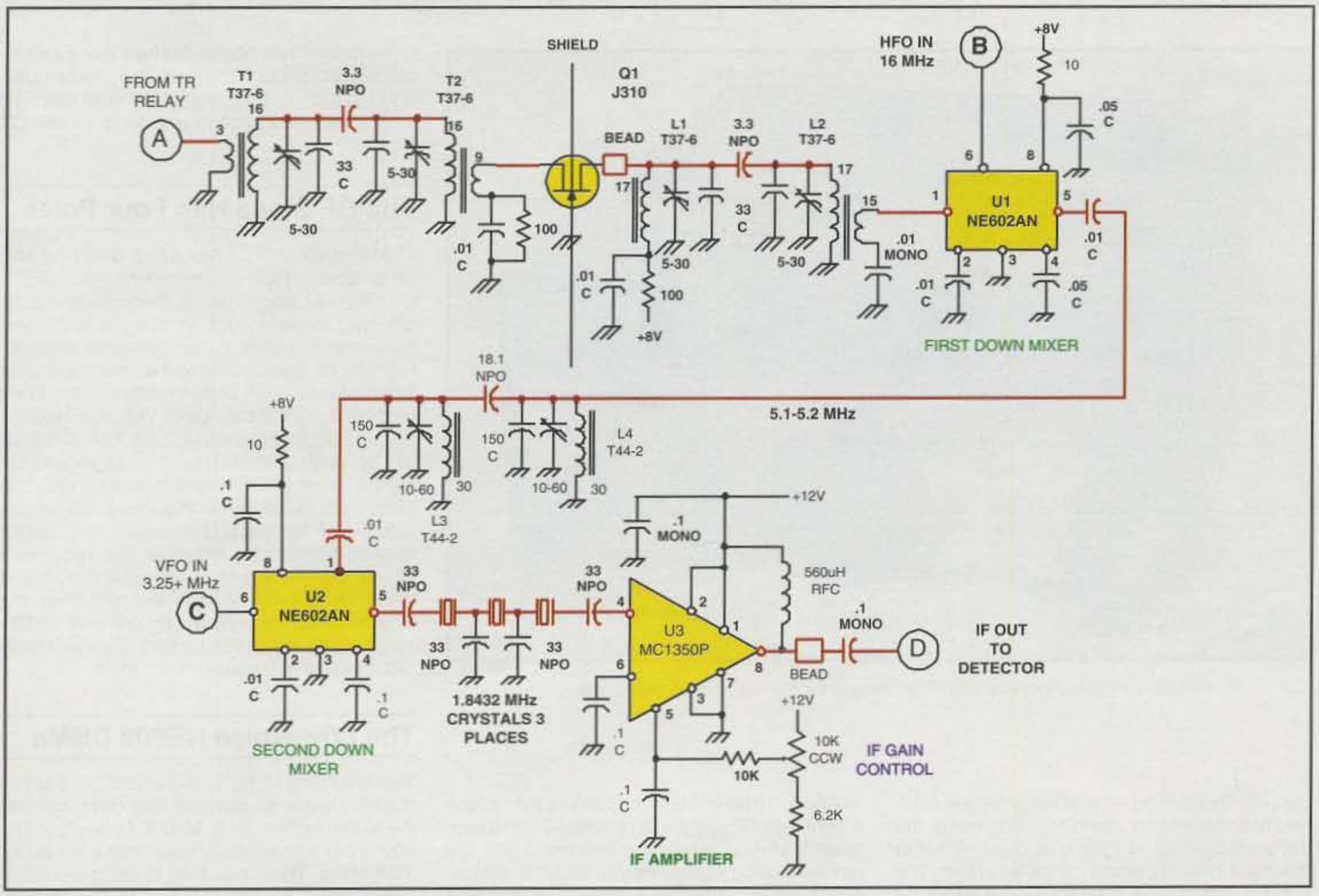

Fig. 1– Schematic diagram of the receiver preamp, first and second mixers, crystal filter, and IF amplifier.

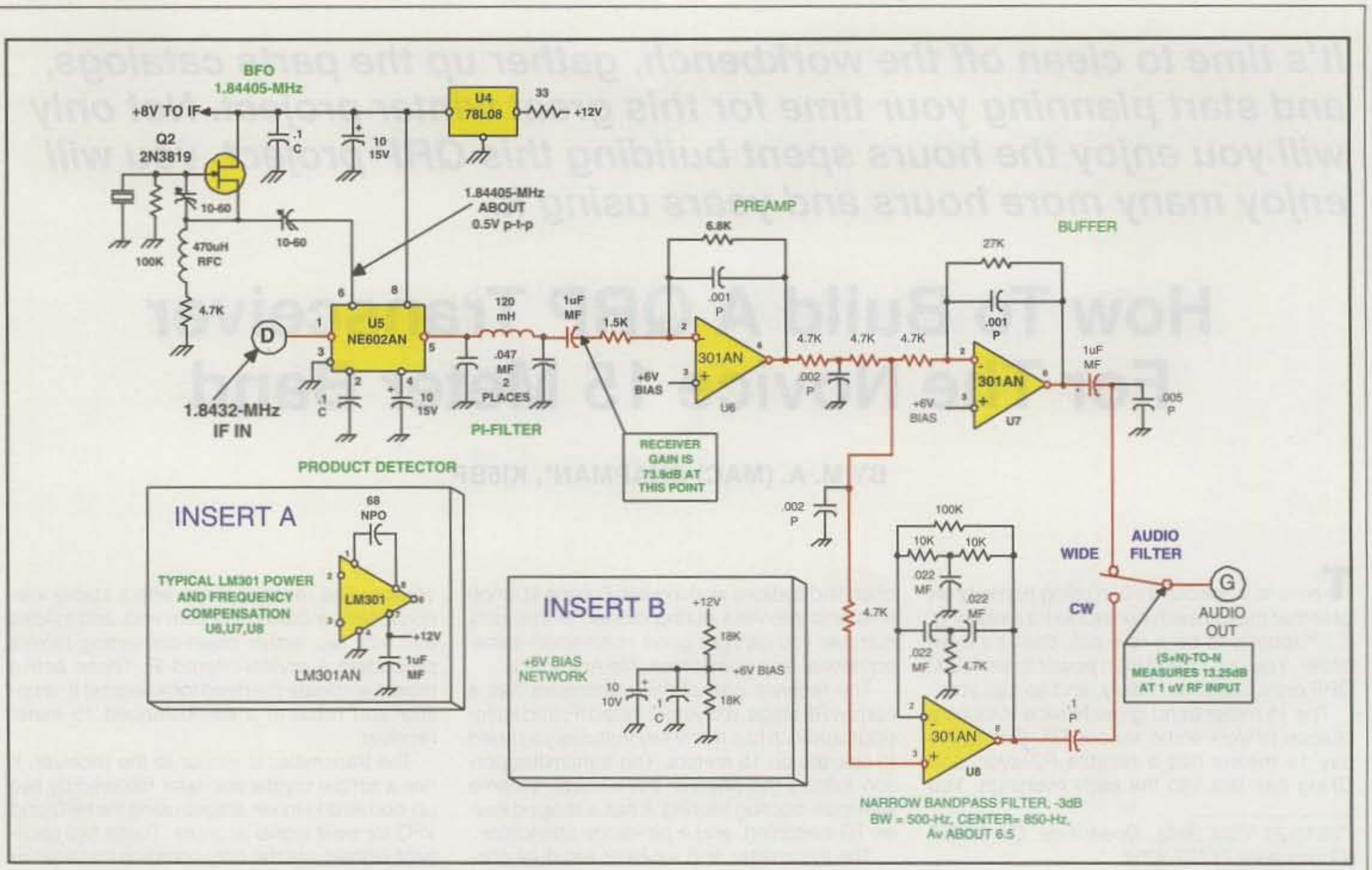

Fig. 2– Product detector, preamp/buffer, and CW filter circuits.

The finished project—a QRP transceiver for the Novice 15 meter band.

circuits. This design separation gives you maximum construction flexibility. Following the transmitter mixer stages is a class-A buffer driving a class-C power amplifier stage. The net power delivered to the antenna is about 1.4 watts.

Above 10 MHz, there are two reasons to use a front-end RF stage in a receiver. First, it provides front-end selectivity; second, it sets the receiver noise figure. Below 10 MHz atmospheric noise usually swamps a front end, and adding an RF stage might make the signal-to-noise ratio worse. Above this frequency the RF-stage gain should override any mixer noise and set the receiver signal-to-noise ratio, so you can reach down and clearly hear those DX signals.

The RF Stage Has Four Poles

The RF stage in fig. 1 has a four-pole filter with an embedded low-noise common-gate JFET, Q1. The net stage gain is modest—about 10 dB—just large enough to overcome the first mixer noise. I favor a common-gate arrangement for its clean match to the antenna and its inherent stability. A bead installed on the drain helps reduce the chance of VHF oscillation.

Two coupling capacitors (a 4.7 pF and a 3.9 pF) between double-tuned circuits around Q1 set the circuit Q and hence the bandwidth. The circuit peaks by replacing these capacitors with 2–7 pF trimmers. Then adjust the stage for desired bandwidth. However, this requires a sweep generator to shape the passband, and using fixed value capacitors simplifies the alignment. Looking ahead, fig. 9 shows the RF-stage voltage-gain versus frequency with fixed value coupling between resonators.

The Low-Noise NE602 DBMs

Two low-noise NE602's, U1 and U2, are active double-balanced devices that down-convert the signal to the 1.8432 MHz IF frequency. The 602 mixer input-output resistances are about 1.5K ohms. This lends itself to using a double-tuned circuit between U1 and U2 for filtering. Although the 602 device is both an oscillator

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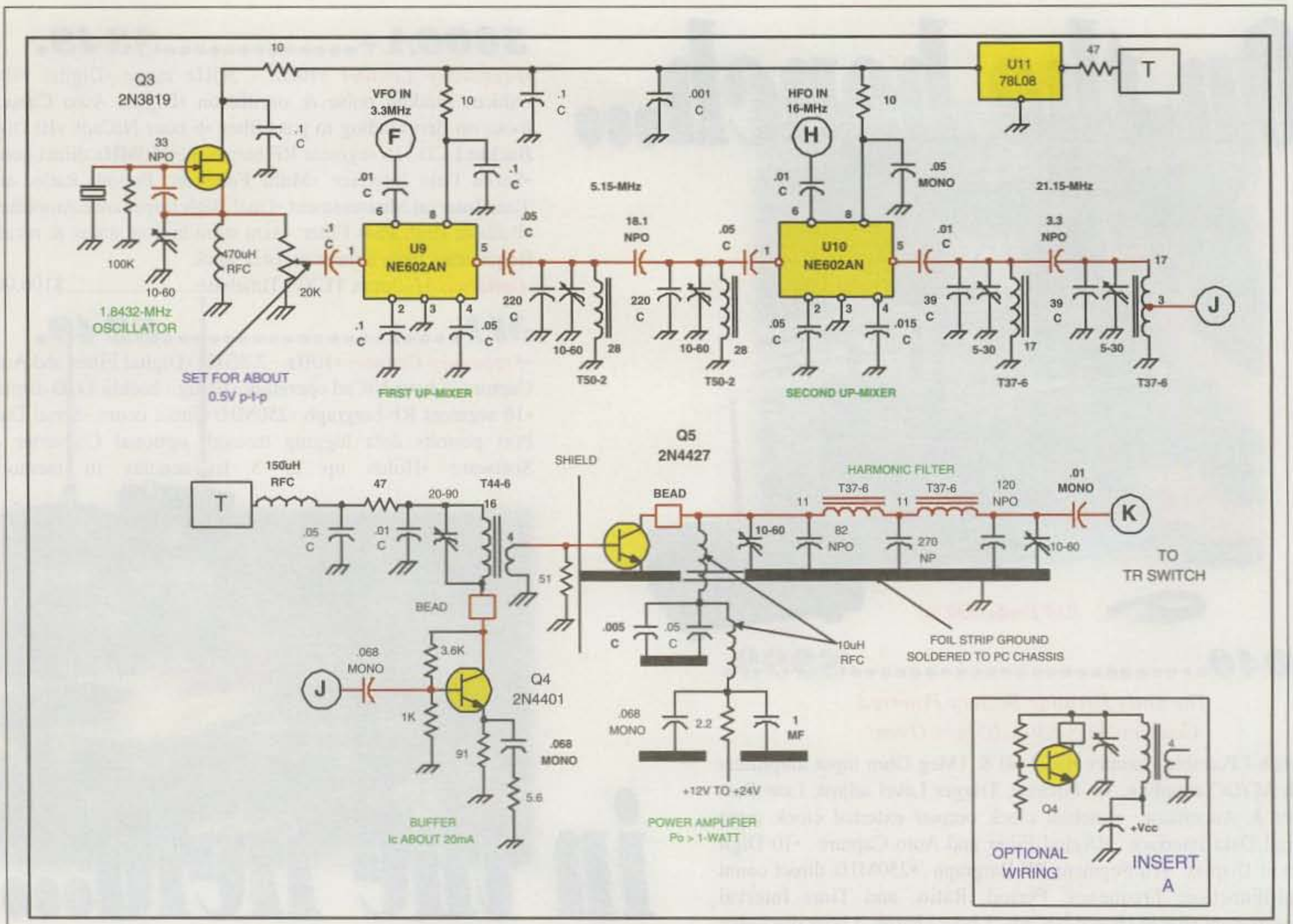

Fig. 3– Schematic diagram of the transmitter oscillator, first and second mixers, buffer, and PA circuits.

and a mixer, I favor using a separate oscillator to filter harmonics before they enter the mixer. The output of the second mixer, U2, simply looks into the three-stage crystal filter.

Most receiver articles emphasize the importance of dynamic range, because the better your receiver large signal response, the more it resists overloading and audio distortion. Most high-quality commercial receivers have a range of about 100 dB. However, a range of 80 dB or so does an excellent job on most amateur bands. It's only on 20 or 40 meters that a two-stage mixer approach is compromising. The 20 and 40 meter bands have a wide range of signal strengths jammed in next to each other, exercising even the best commercial units. In this transceiver, I traded passive-mixer complexity for something that's easier to build and still does a creditable job.

To reduce unwanted IF-signals, you need a filter to sharpen the passband side skirts. You could use an expensive (more than $50) commercial crystal filter, but another idea is to build your own. The three-section crystal filter in fig. 1 follows the ladder design suggested by W7ZOI[1]. All the filter capacitors have equal value—33 pF. These capacitors determine the filter bandwidth (about 800 Hz). Larger values of capacitors will decrease the bandwidth, while smaller values will increase the bandwidth. When you increase the crystal filter capacitor values, you decrease its bandwidth and increase your tuning problems. If the passband is too narrow, you might tune through a signal between key strokes without knowing it. Sometimes the station you are working is unsteady (drifting), and you will constantly be adjusting your receiver to match this drift. A wider filter width reduces this type of problem. I suggest an 800 Hz width because it's a good compromise for Novice band operation. Later, when you move down into the General area, you can add more crystals to the ladder and reduce the bandwidth.

I suggest you buy inexpensive 1.8432 MHz crystals and match them yourself. The transmit and IF frequencies need to be identical so that stations you are working hear the same beat tone as you do. You simplify the problem using another 1.8432 MHz crystal in the transmit oscillator stage. You may cull the BFO crystal from a group of IF crystals or order it separately. If matching the crystals is a problem, buy inexpensive, computer-grade 25 PPM crystals. They will work equally well.

The IF Amplifier Has High Gain

Fig. 1 shows the IF amplifier. An integrated circuit, U3 MC1350, it offers high gain in a small package. This IF-stage measured gain is above 40 dB, and rather than an AGC, the design has a front-panel IF gain control. With the low station density on 15, there is plenty of time to adjust the gain if an occasional strong signal appears. The fringe benefit is it simplifies the design. An AGC is something you can always add later on.

Another NE602 DBM acts as a product detector, U4, in fig. 2. The output of this mixer looks into a pi-filter for initial audio shaping. Like the other active DBMs, a separate oscillator, Q2 in this case, supplies the beat signal. If you skip ahead to fig. 3, you will see a similar FET oscillator circuit, Q3, in the transmitter first up-converting mixer stage, U9.

Fig. 2 also shows the audio op-amp buffering and filtering scheme. The detector LC filter cutoff is about 2 kHz and looks into a simple RC-controlled, low-noise op-amp arrangement—U6, U7, and U8. The first op-amp stage is a low-gain buffer that drives a CW filter and a gain stage for SSB audio.

You could use a double or quad op-amp package for these circuits. However, I find that separate devices add flexibility in building and testing the system. It makes it easier to add or change the op-amp filter arrangement later.

There Are Four Oscillators

There are four oscillators: a tunable VFO, an HFO, a BFO, and a transmit oscillator. All four oscillators affect transceiver stability, and all

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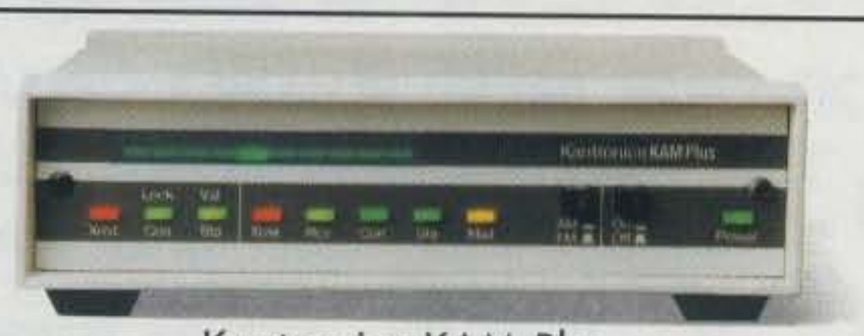

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Chassis viewed from the side with the digital counter removed. The board on the top is the receiver assembly. The RF stage is in the back, and the detector is in the front. The BFO crystal on the right end near the front panel can be seen in the photo. The board in the center contains the VFO and HFO circuits. These circuits are shielded from the adjacent receiver and audio stages with thin pieces of plated foil soldered to a copper-clad board acting as a main chassis. The audio filter, buffer, and PA circuits are on the bottom board. This assembly also has the sidetone oscillator and shaped keyer.

four oscillators need to be stable and contain good signal quality to reduce IMD in the mixer stages.

The VFO in fig. 6 is a W1FB Clapp variation, Q12, with an AC-coupled FET-to-FET amplifier, Q12 and Q13. All frequency-sensitive capacitors are polystyrene or NPOs selected for minimum drift. The output stage is a transformer splitter followed by separate pi-filter circuits. The VFO tuning range is about 105 kHz. If you use an 8:1 reduction drive, you will tune at about 25 kHz-per-revolution. In a 24-hour test the net VFO drift measured less than 400 Hz. The worst-case peak drift was under 500 Hz in 8 hours.

The 16 MHz HFO in fig. 7 is a simple crystal oscillator followed by an AC-coupled FET buffer, Q14 and Q15. Like the VFO, the HFO uses transformer-splitting with pi-filtering to match the NE602 mixer input resistance. This down-conversion combination puts the VFO and IF center frequency low enough that good gain and stability are easy to get. The pi-filtering in these oscillators reduces overtones in the beat signals to reduce IMD.

The TR Switch and Keyer

Figs. 4 and 5 show the TR switch and keyer circuits. A simple NPN combination, Q7 and Q8, drive a +12V relay for TR switching. The hold time is about 1 second, which keeps the relay closed long enough for most 8–10 WPM contacts. If you find your keying rate is slower and the relay switches between code groups, you can increase the RC values (100 ohm or 22 µF) to lengthen the hold time as needed.

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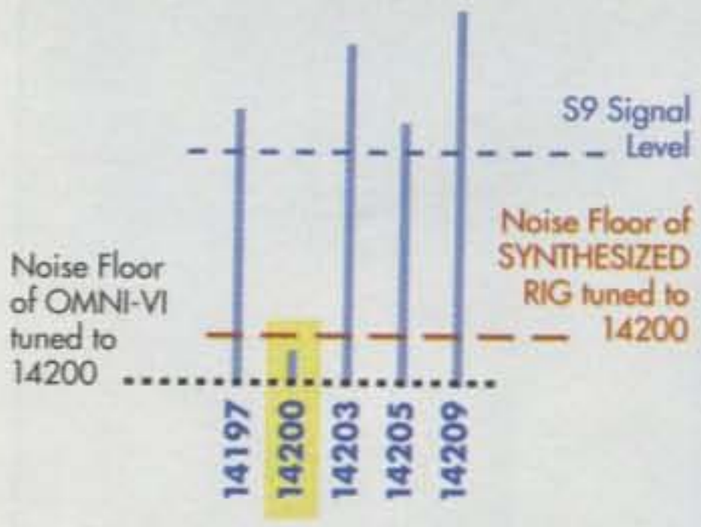

Noise floor doesn't change in the presence of nearby strong signals. Work the weak one at 14200 just over the noise.

Noise floor increased in presence of nearby strong signals. Can't even hear weak signal at 14200.

Phase noise causes the noise floor to *temporarily* increase covering weak signals *inside* your passband especially when strong signals *outside* your passband are within a few KHz of where you'd like to listen.

Crystal mixing

OMNI-VI is the only modern high performance amateur transceiver to use crystal mixing—chosen over a synthesizer

OMNI-VI virtually eliminates phase noise as a factor in receiver performance.

because it provides the very best phase noise performance of any technology. Phase noise is essentially eliminated as a factor in receiver performance. Treat yourself to the best on HF.

OMNI-VI also features

Superb Selectivity - cascading filters from both I-Fs for a minimum of 16 poles of filtering. Up to 4 accessory filters can be added providing 20-24 poles of filtering.

"DSP" Automatic Notch Filter instantly and automatically eliminates interfering carriers at the touch of a button.

SPORT PC Interface - Fastest, most comprehensive interface in the industry.

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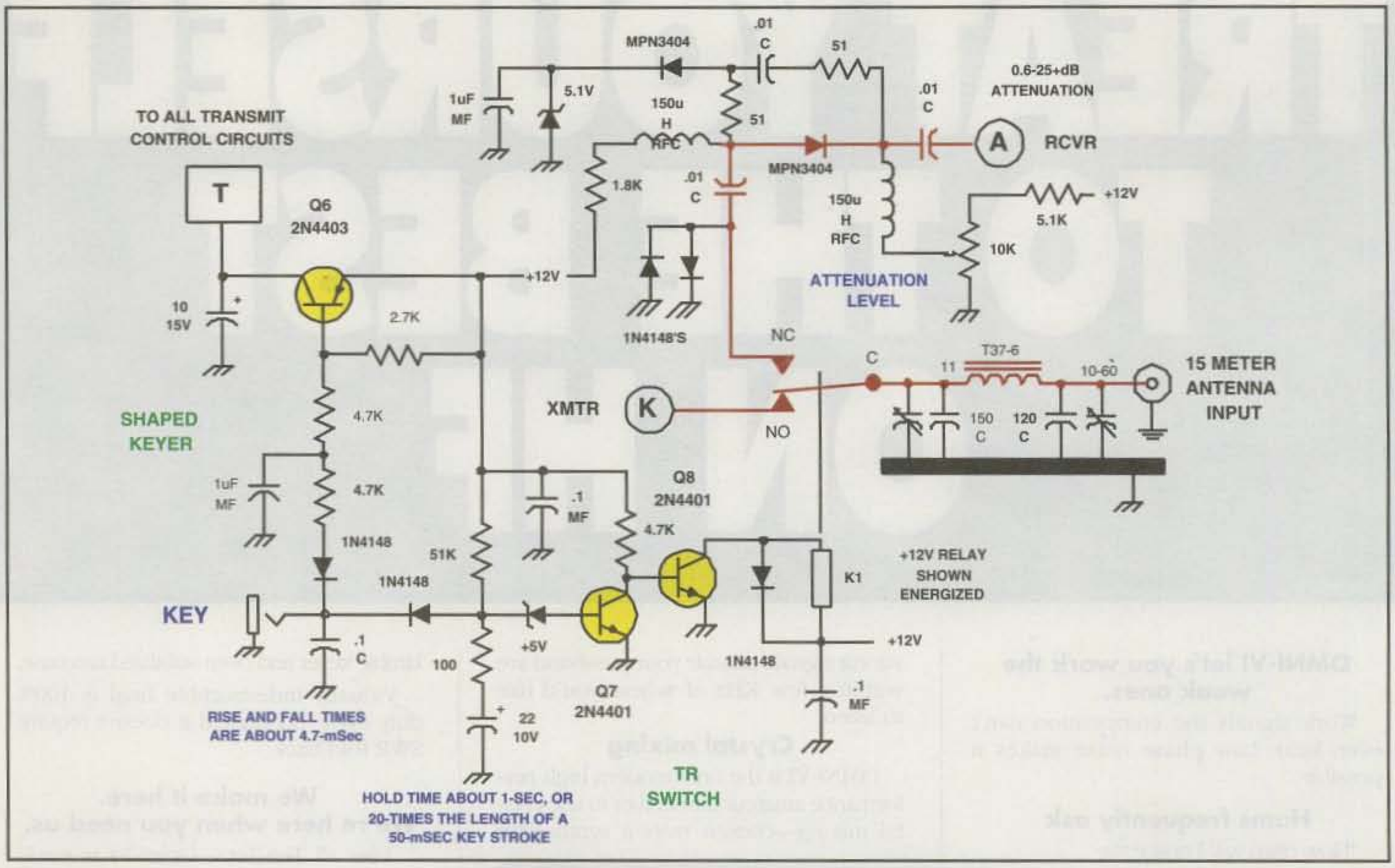

Fig. 4– Schematic diagram of the TR switch, shaped keyer, and attenuator circuits.

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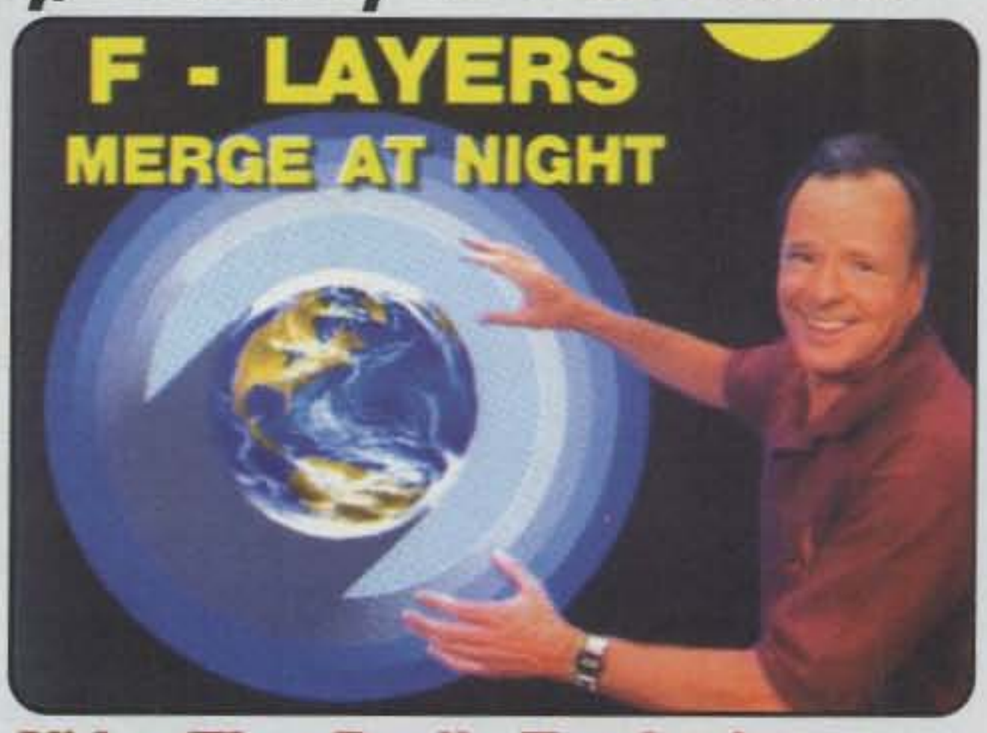

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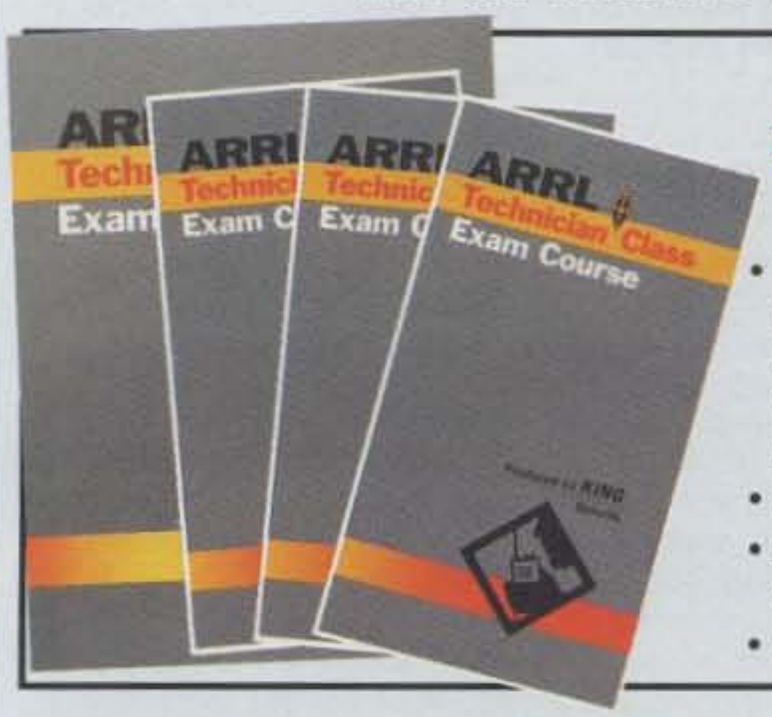

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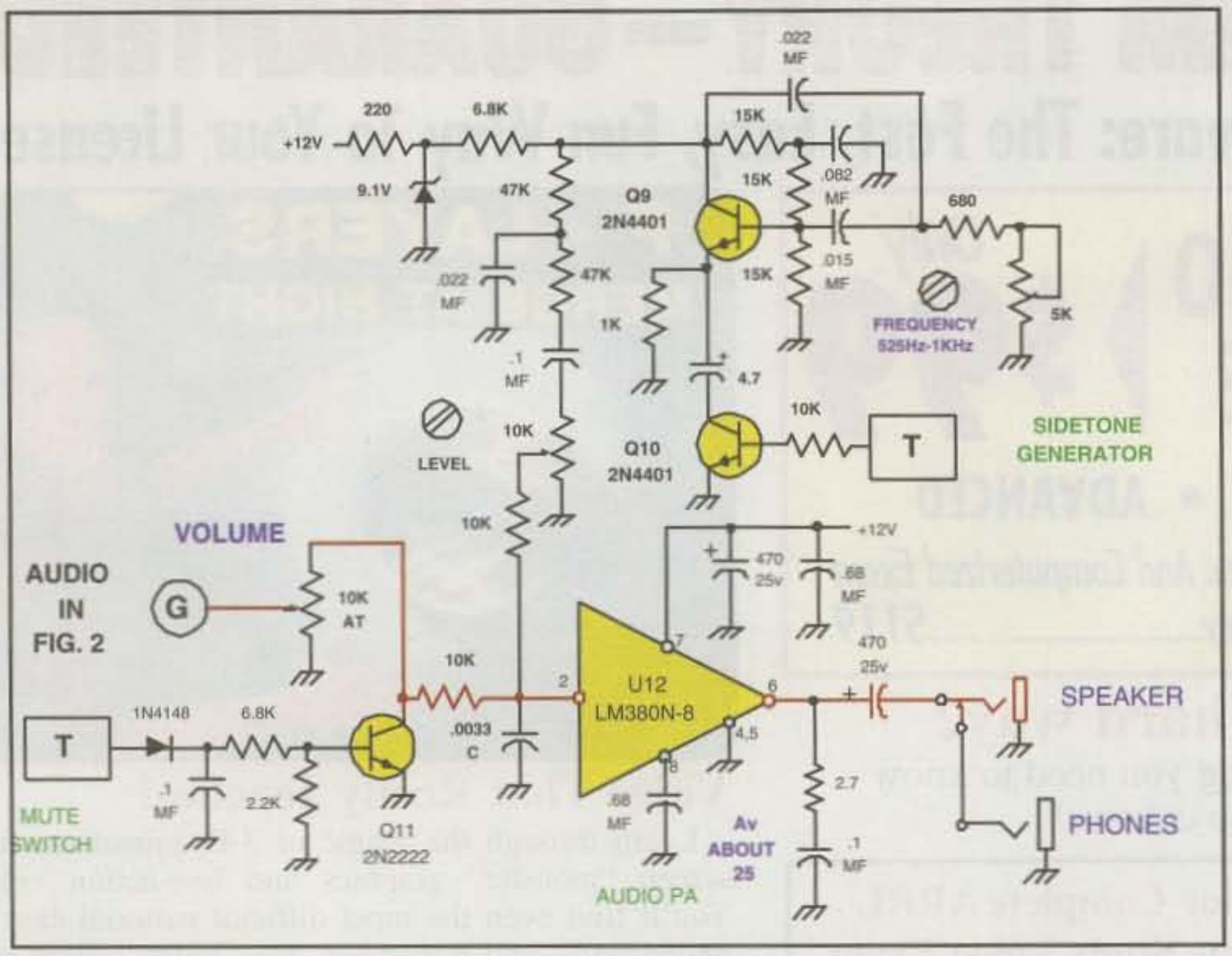

Fig. 5– Schematic diagram of the mute, sidetone oscillator, and audio PA.

The shaped +12V transmit (**T**) line gives the output CW wave a rise and fall time of about 4.7 msec as recommended by the ARRL. When you get to the 20 WPM point, I suggest you change the RC resistance value from 4.7K to 2.2K. This will decrease the CW-wave rise and fall time and improve your break-in contact rate.

Both the transmit and receive signals pass through a pre-post pi-filter conditioner acting as a simple antenna match. The receive signal passes through a front-panel-controlled pin-diode attenuator. In the attenuator, a 5.1V Zener adds a reference voltage in a two-diode bridge-tee arrangement. As the front-panel control increases, the current through one diode increases while the current through the other diode decreases. This keeps a constant resistance across the receiver terminals.

Fig. 5 shows that the +12V transmit lines (**T**) set the audio mute, Q11, and sidetone signal, Q9 and Q10. The RC sidetone oscillator includes both frequency and level trimming to suit your needs. A simple 8-pin, 1 watt audio amplifier, U12, serves as an audio output stage.

Two Mixers Follow The Transmit Oscillator

The crystal oscillator, Q3 in fig. 3, looks into two up-converting mixer stages, U9 and U10. The 21.1 MHz signal leaving U10 is about 0.5V P-T-P. It only requires a single power stage to lift the signal up and drive the output PA, Q5. The transmitter "keys" the crystal oscillator, both mixers, and the buffer stage. I used a pi-network output stage to match a 50 ohm antenna load to the collector of Q5. In this case, the pi-circuit offers only small resistance matching because the antenna load of 50 ohms is about the same as the collector load. Therefore, the circuit acts as a low-pass filter to reduce harmonics. The peak RF power output you can expect is about 1.44 watts with a +12V supply.

The number of transistor you could use in these circuits is endless. I used a variety of buffer devices (2N3904's to 2N2222A's), and they all performed equally. I favor the 2N4401 for its heat margin. Output transistors such as a 2N5859 or 2N5189 are similar to the 4427. The 2N5859 is just a little stronger. Use a heat sink on the Q5 transistor to reduce any thermal problems.

When testing this amplifier arrangement, you need some way to check the output. If a power meter is not available, I suggest using a 51 ohm, 1 watt resistor with a VTVM/RF-probe measuring the output. You can check the keying waveform with your station receiver to be sure it's clean.

Different Priorities

Everyone who builds a home-brew project has a different set of priorities. It depends a lot on what your end desire is. Do you want something "cobbled" together or something you can operate with pride? Any home-brew project is a "get what you put in" effort. Its final quality and appearance equal the effort you give it. If you want something that works well and looks good, you need to relax and take your time building one stage at a time. You need to test each stage and understand how it works before going to another. When you get to the last stage, just "tweak" a little, and presto, it's done!

Dedicated PC boards make projects easier, but it takes excessive effort to develop a board for one-of-a-kind use. My experience

(Continued on page 138)

INSERT A

OPERATING FREQUENCY: 21.1-21.2 MHz
NOMINAL HFO FREQUENCY: 16 MHz
NOMINAL IF FREQUENCY: 1.8432 MHz
NOMINAL VFO FREQUENCY: 3.25-3.35 MHz

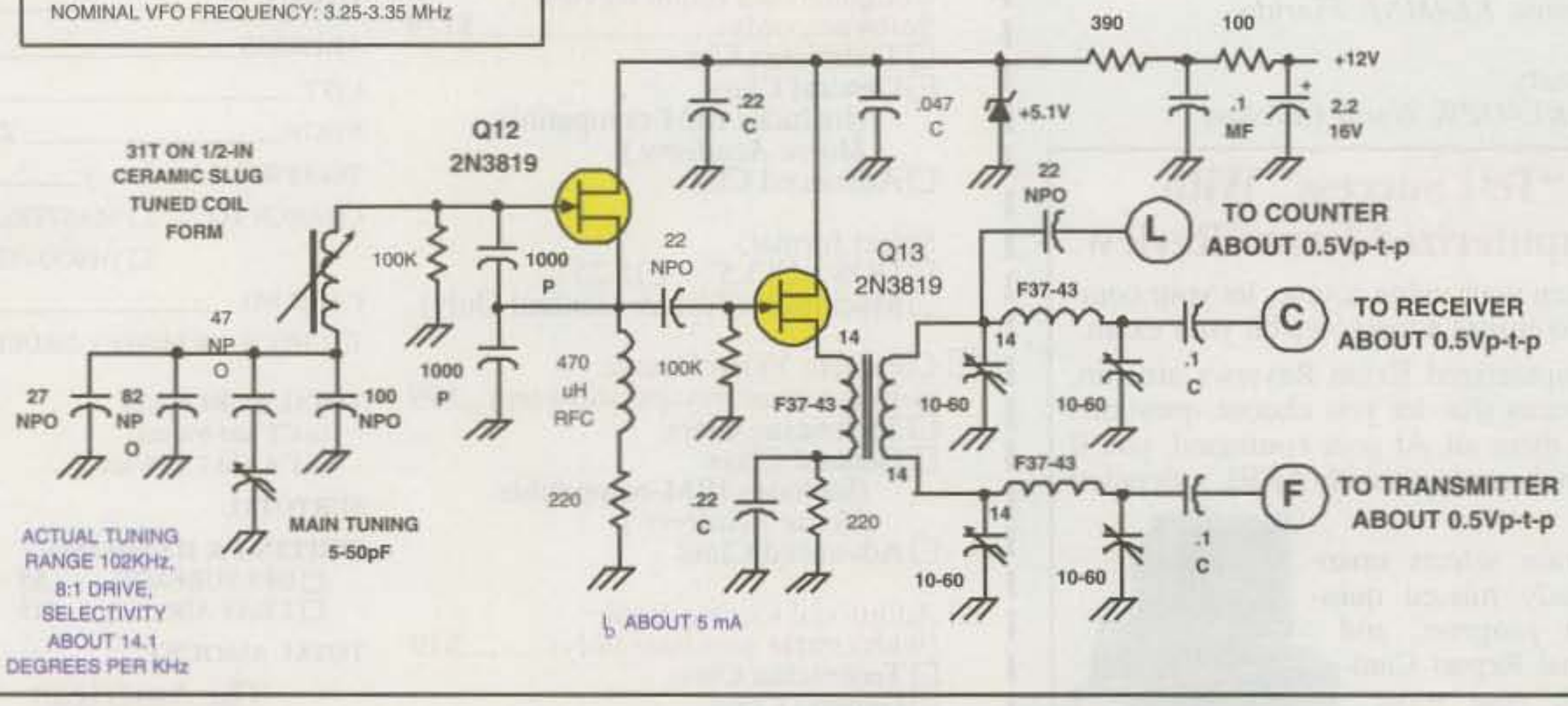

Fig. 6– Schematic diagram of the VFO.

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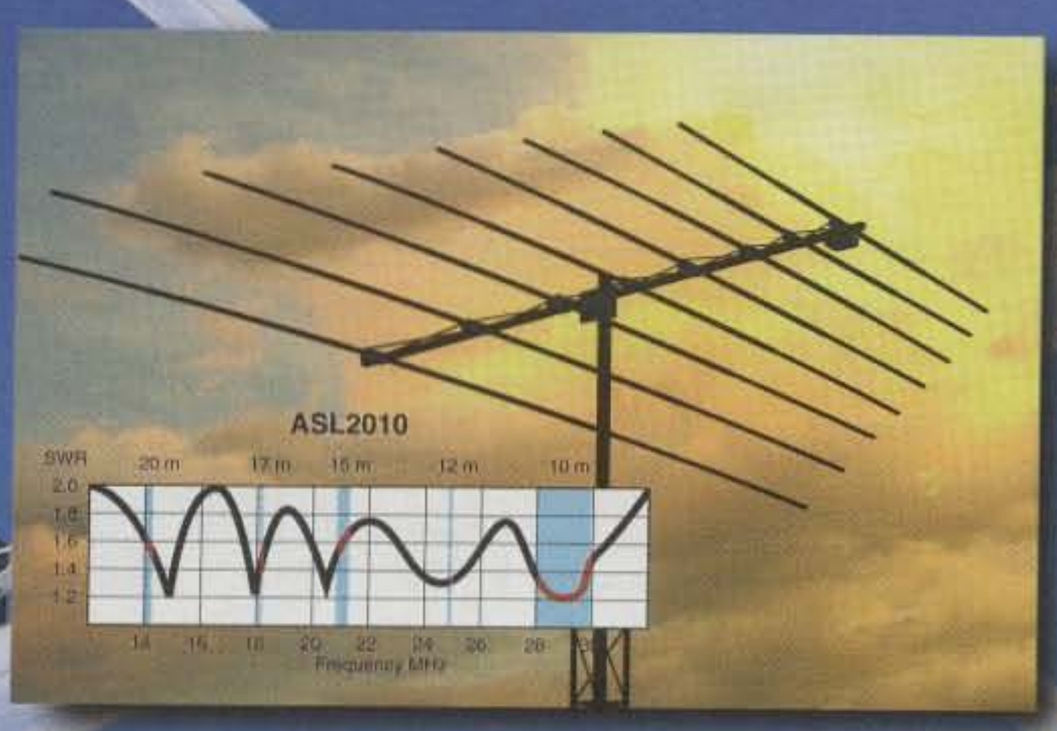

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- **6.4 dBd gain, 65 degree beamwidth**
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MODEL	ASL2010
Frequency, MHz	13.5-32
No. Elements	8
Forward Gain, dBd	6.4
Front to Back Ratio, dB	15-20
SWR 1.2:1 Typical	
2:1 Bandwidth	18.5 MHz
Power Rating, Watts	2000
3 dB Beam Width, Deg. E Plane	65
Boom Length, ft (m)	18 (5.48)
Boom Diameter, In (cm)	2.0 (5.08)
Longest Element, ft (m)	38 (11.58)
Element Center Dia, in (cm)	1.25 (3.18)
Turning Radius, ft (m)	19.25 (5.86)
Mast Size Range, in (cm)	1.5-2 (3.18-5.08)
Wind Load, ft^2 (m^2)	10.1 (.93)
Weight, lb (kg)	55 (25.5)

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It's been about 20 years since Gordon Eliot White's "Surplus Sidelights" column appeared in CQ. Our 50th anniversary wouldn't be complete without a retrospective of those wonderful years of surplus.

SURPLUS sidelights

A Retrospective

BY GORDON ELIOT WHITE*

Earlier this year I received a wonderful surprise in the form of a letter from Gordon Eliot White. Gordon, as many old timers will recall, was our "Surplus Sidelights" editor during the 1960s and wrote extensively and with great expertise on military surplus. Times changed, surplus faded from the scene, and Gordon moved on in his real-life career as a reporter.

Earlier this year Gordon picked up a copy of CQ's 50th anniversary special issue (January 1995) on the newsstand and started to think in terms of doing a surplus retrospective. He contacted us to see if we were interested. He needn't have wondered, as the answer was a resounding yes.

Amateur radio of the 1950s and '60s was based on surplus, as were a tremendous number of pages in CQ. We were very fortunate to have Gordon as a columnist for about 11 years and to share his interest in and enthusiasm for military electronic surplus. Although Gordon never became an amateur, his column made amateur radio more fun, more informative, and certainly more financially accessible for a lot of us.

It wouldn't be a complete celebration of 50 years without touching on one of the biggest building blocks of our hobby and without hearing from one of its biggest advocates.—K2EEK

As Bill Orr, W6SAI, wrote in the first of the 1995 CQ 50th anniversary issues, military surplus World War II electronic equipment flooded the market in 1947 and 1948. There were BC-348 shortwave receivers, built for B-17 and B-24 bombers, that were dumped by the thousands by the War Assets Administration. Other equipment ranged from miles of coax cable at a few cents a foot to obsolete radar transceivers that were useful chiefly for parts.

I remember buying a once super-secret Norden bomb sight for $3.00. It wasn't of much use to me, but the intricate, finely-cut gears in the analog computer were a wonder to my 15-year-old eyes.

*Box 3067, Alexandria, VA 22302

One of the early surplus goodies was the SCR-522, the first VHF transceiver to be used by the Air Corps. It was a British design and even carried a red crown on the identification tag. The four-channel SCR-522 made a decent 2 meter rig with only a little tweaking.

Most of the best surplus was aircraft equipment. There was a lot more of it than shipboard or fixed-station gear, and it was lighter and more compact. Remember dynamotors, used to convert aircraft or Jeep 12 or 24 volt DC power to 250 volts? They sure put out a lot of radio frequency noise.

The nomenclature was always difficult to fathom. The Army's Signal Corps started before WW I with SCR numbers (Set, Complete, Radio) and BC (Basic Component) numbers below that. The Navy used a different system—RA for Radio, Aircraft, followed by a third letter indicating its alphabetical sequence. The Navy ran through the RA alphabet (. . . RAV, RAW, RAX, RAY, RAZ) by 1940 and started over with the identifying letter in front (ARA, ARB . . .) early in the war. Eventually a joint numbering system was set up and known as AN—i.e., AN/ARC-1, AN/ARC-5, etc. All three systems existed together throughout the war.

I came to write *CQ*'s "Surplus Sidelights" column by the back door. I was raised in the town next to Boonton, New Jersey, where Aircraft Radio Corporation built the Command sets, the most ubiquitous of the surplus equipment. I knew some of the design engineers and became intrigued by some of the articles on the Command sets in *CQ* and its competitor, *73 Magazine*. Being at the time a reporter in Washington, I went to the Navy and the Signal Corps and looked up the contract files on the SCR-274N, the AN/ARC-5, and the other versions of the Command Sets.

My first piece for *CQ* in November 1964 was more a history than a technical article. I listed all the various models of the Command Sets, from the rare RAT and RAV models of 1940, to the equally rare R-112/ARC-5 and T-90/ARC-5 of 1945. That piece described how A.R.C. had come into being in 1922 as an engineering concern. From entertainment and auto radio designs A.R.C. went into the aircraft market and built the receiver that Lt. Jimmy Doolittle used in 1927 in the first blind landing. The company sold a short-range transmitter-receiver set to the Navy and the Air Corps in the early 1930s that, with only a few changes, was still being produced as the SCR-183 and GF/RU at the time of Pearl Harbor.

Because of the need to produce existing designs until new ones could be manufactured in quantity, there was a lot of waste in WW II procurement. It seemed sometimes as though plants were set up just to build unneeded material. The old tuned-radio-frequency GF/RU equipment was manufactured long after it was made obsolete by the SCR-274N. Fortunately, someone wanted it. The Brazilian Air Force was still buying GF/RU parts in the late 1960s.

The year 1933 was crucial for aircraft communications in the U.S. Because of corruption in the commercial air-mail contracts, President Franklin D. Roosevelt ordered the Army Air Corps to fly the U.S. Air Mail in February of that year. The Air Corps was grossly unprepared for bad-weather flying and lost 10 pilots in two months. A board headed by former Secretary of War Newton B. Baker investigated the air-mail disaster and blamed much of it on the Air Corps' inadequate communications.

A.R.C. then designed the first compact transmitter and superheterodyne receiver for aircraft, but was unable to sell it to the military. It was not until 1939 that the Navy bought the design, and not until 1940 that the Army adopted it as SCR-274 (N) for Navy Design.

It was this Command equipment that was eventually produced in the millions of units between 1940 and 1947. Some versions, particularly the BC-453 190–550 kHz receiver, were carried in Air Force planes into the 1980s for navigating via low-frequency beacons in less developed countries.

The same BC-453 (known as the Q-5er) and the slightly later R23A/ARC-5 receivers were highly prized by amateurs because of their extremely sharp 85 kHz intermediate frequency transformers. The standard 455 kHz IF of a commercial amateur receiver could be fed into the front end of the BC-453 to provide extremely sharp tuning. With the slugs in the 85 kHz

transformers pulled up you could clip the AM sidebands. With some extra work the BC-453 could be made sharp enough to receive single-sideband transmissions.

Writers such as E.H. Marriner, W6BLZ, wrote numerous pieces on the Command Sets in various guises. The transmitters were turned into portable or mobile rigs in great profusion.

My "Surplus Sidelights" column had its debut in *CQ* in February 1966 with a piece on the Collins AN/ARC-58 HF transceiver out of B-52 bombers. The ARC-58 was a synthesized crystal design, quite advanced for amateurs. Unfortunately, it was remotely controlled, and hooking up the often missing control head was an exercise in spaghetti if the cables and multilead heads plugs were not available.

In the same 1966 issue RW Electronics was still selling R-23 receivers new in the original boxes for $29.95. New BC-457 transmitters went for $9.95 each.

The column sought to describe commonly available surplus equipment, offer circuit diagrams and sources of tech manuals, as well as suggest uses for sometimes puzzling pieces. These were sets such as the AN/ARR-2, which fit in the AN/ARC-5 racks and was used by carrier pilots to find their ship. To make it hard for Japanese attackers to home in on the carrier the transmitters used a double-modulation scheme that was supposed to fox the enemy. This was a difficult receiver to use for amateur purposes except as parts.

That first year the Boehme 5C teletype converter showed up on the surplus scene, along with the URR-13 receiver and RDZ receiver.

In 1967 I described the AN/TXC-1 military facsimile transceiver. Amateurs were experimenting with TV, RTTY, moon bounce, and a variety of other modes, and facsimile was one of the newest. Unlike 1995 FAX machines, facsimile in the 1960s required large mechanical equipment and special hard-to-get paper.

During both the Korean War and early in the Viet Nam conflict the military found it wanted back some of the gear it had dumped as surplus. In 1967 Liberty Electronics and Technical Systems Corporation advertised in *CQ* to buy radar and surveillance items such as the AN/APN-3, AN/APA-12, and the like. It was not uncommon for the Air Force to pay thousands of dollars for gear it had dumped for pennies as we rushed to re-arm.

As military electronics progressed, the surplus became more and more exotic, compact, and in some cases hard to use. The stars of the later wave of surplus were test equipment and costly receivers such as the first digitally tuned Collins R-390 and 390-A high-frequency receivers. The R-390's replaced the old analog-tuned SP-600 receivers in the military inventory. Unlike present digital-readout receivers, they had mechanical digital readouts. These were beautiful examples of Collins engineering with excellent IF filters. They were the last gasp of tube technology before the little three-legged fuses known as transistors, and finally integrated circuits, took over.

A large part of the usable later surplus came from monitoring stations run for the National Security Agency. Fine receivers and test gear were used in listening in to the Soviets, and the early surveillance versions came on the market here in the 1960s.

Much of the mid-1960s surplus material was radio teletype. The first, just after WW II, were the Teletype Model 14 and 15 keyboard printers and the heavier Model 19. Eventually the superbly built Model 28 printers, capable of 100 words-per-minute printing, came on the market. By 1969 teleprinter demodulators complete with oscilloscopes were showing up, and Morse-to-Teletype converters and even Western Union Telefax units could be bought very cheaply.

In 1970 many of the tiny AN/URC-4 rescue-pack transceivers and the AN/PRC-40 FM transceivers were available.

NASA telemetry material and the Kleinschmidt #311 RTTY keyboard printer were next, in 1971, along with cryptological sets such as the 131B2—if you could figure out a use for them.

Later Command set descendants included the AN/ARN-30 "omni" navigation receiver. The ARN-30 was good as a tunable little 2 meter unit. It came along in numbers in 1972, as did the R-13, a voice version of the VHF Command set. The AN/ARN-30D was a crystal-controlled, 180-channel version.

In 1973 there was a shakeout of the by then corrupt or at least chaotic surplus sales system. There was a prolonged freeze on auctions that shook the market that year. After the freeze ended, many AN/PRC-8, 9, and 10 FM transceivers were released, covering the 20–54 MHz bands. Likewise, in 1973 the AN/TRC-77 receiver, 3–8 MHz, came on the market, as did the big (250 lbs) AN/WRR-2 two to 32 MHz receiver. These were the last of the tube types, and because of their miniaturization and modular construction, they were hard to use if they were not in good shape. Finding parts was impossible and working on them was difficult.

The year 1974 saw AN/ARN-14, AN/ARR-52, and AN/ARR-41 sets being surplused, but these were becoming so specialized as to be almost more trouble to convert to amateur use than they were worth. There was no flood of post-Viet Nam surplus as that war wound down. Some old WW II items continued to trickle out of government warehouses, but by the end of 1975, thirty years after VE-Day, most of the surplus gear we saw was either antique or obsolete for amateurs, in truly scrap condition, or designed for frequencies or modulation schemes not of interest to the amateur.

The well was dry by 1975. Amateurs had moved on, and I folded the "Surplus Sidelights" column at the end of that year. I continued to receive mail for years, largely from fans of the Command sets, some not amateurs but merely people intrigued by the elegance of the little receivers and transmitters that were so advanced when they were designed in 1936.

Aircraft Radio Corporation was sold to Cessna Aircraft in 1959. In 1983 Cessna sold A.R.C. to the Sperry Corporation, which moved the product line to Phoenix, Arizona. Finally, after 57 years, the little white-painted Boonton plant, nestled along the Rockaway River in the rolling hills of northern New Jersey, was closed forever.

The receiver Jimmy Doolittle used in his 1927 blind landing research went directly to the Smithsonian. I was given the bulk of the company papers, which the Smithsonian did not then want.

I had collected every kind of Command set item imaginable and had in all about 4000 pieces of WW II electronics gear. In 1983 I donated the bulk of that cache to the Smithsonian's Air & Space Museum, where it resides today as a stock to be used in restoring various WW II military aircraft. In 1986 I gave the museum's library the bulk of my collection of technical manuals, contract documents, photographs, and the residual papers of Aircraft Radio Corporation.

Anyone interested in a detailed history of A.R.C. and the Command Sets can look up a piece I wrote for the AOPA *PILOT Magazine* in June 1984.

For amateurs, surplus military equipment opened the way to much low-cost communicating, particularly mobile and portable operations. The equipment was a cross-section of the material that helped us win WW II, and it has now faded into history. They are receivers and transmitters that most modern amateurs will see only in museums, and in the back rooms of the old-timers who remember getting the SCR-522 up on 2 meters, and running the IF of their 40 meter receiver through a Q-5er to sharpen up the signal. ■

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It doesn't light up or do anything, but it still makes a great, useful construction project. It would also make a great club project.

How To Build A Surge Protector For Your Rotor Cable

BY PHIL SALAS*, AD5X

Most of us have a healthy respect for what a lightning strike can do to our amateur radio equipment, accessories, computers, and home. We generally do a good job of providing a good tower ground and coax ground, and have a way of shorting our coax and/or disconnecting it during a thunderstorm. However, how many of us worry about that multi-conductor rotator control cable that comes down into our shack? Well, for around $10 you can provide pretty good protection for your rotator cable.

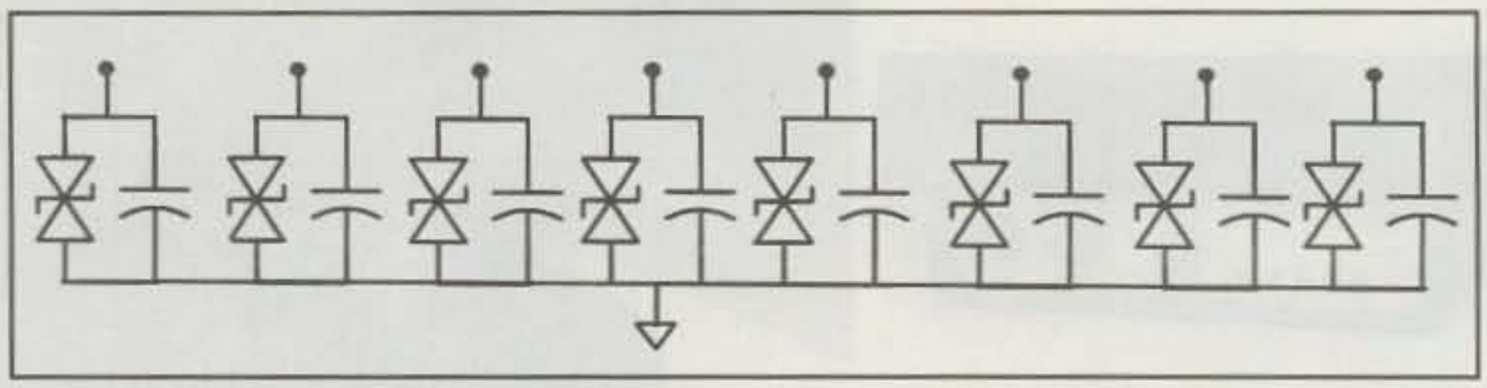


Fig. 1– Schematic diagram of the rotor cable surge protector. The MOVs are rated close to the operating voltage of the rotor and all capacitors are .01 µF @ 500 volts.

Rotator Protection

What does it take to protect your rotator cable so that it doesn't conduct lightening problems into your shack? Well, excellent transient protection is provided nowadays by Metal Oxide Varistors (MOVs). MOVs are kind of like an AC zener diode which conducts heavily when its breakdown voltage is exceeded. They protect against high transient voltage spikes by going from a very high impedance value to a very low conducting impedance value whenever a transient voltage above the MOV's breakdown voltage occurs. These devices can conduct very high currents for short periods of time and are normally rated in peak current for some given time. And, these devices are inexpensive. MOVs are made by Harris, Thompson, GE, and others and come in a variety of breakdown voltages.

To provide maximum protection, you should pick a MOV that is relatively close to the maximum voltage on the line that you are trying to protect. In my case I was trying to protect the control lines of a HAM IV rotator which operates on 30 VAC RMS. For this I picked the Thompson VZA048XX MOV. This device is rated at 48 volts RMS and only costs 31 cents in unit quantities from Mouser Electronics (800-346-6873). The specification on this device is that it will handle 800 amps (!) for 20 microseconds.

Cable Protector Box

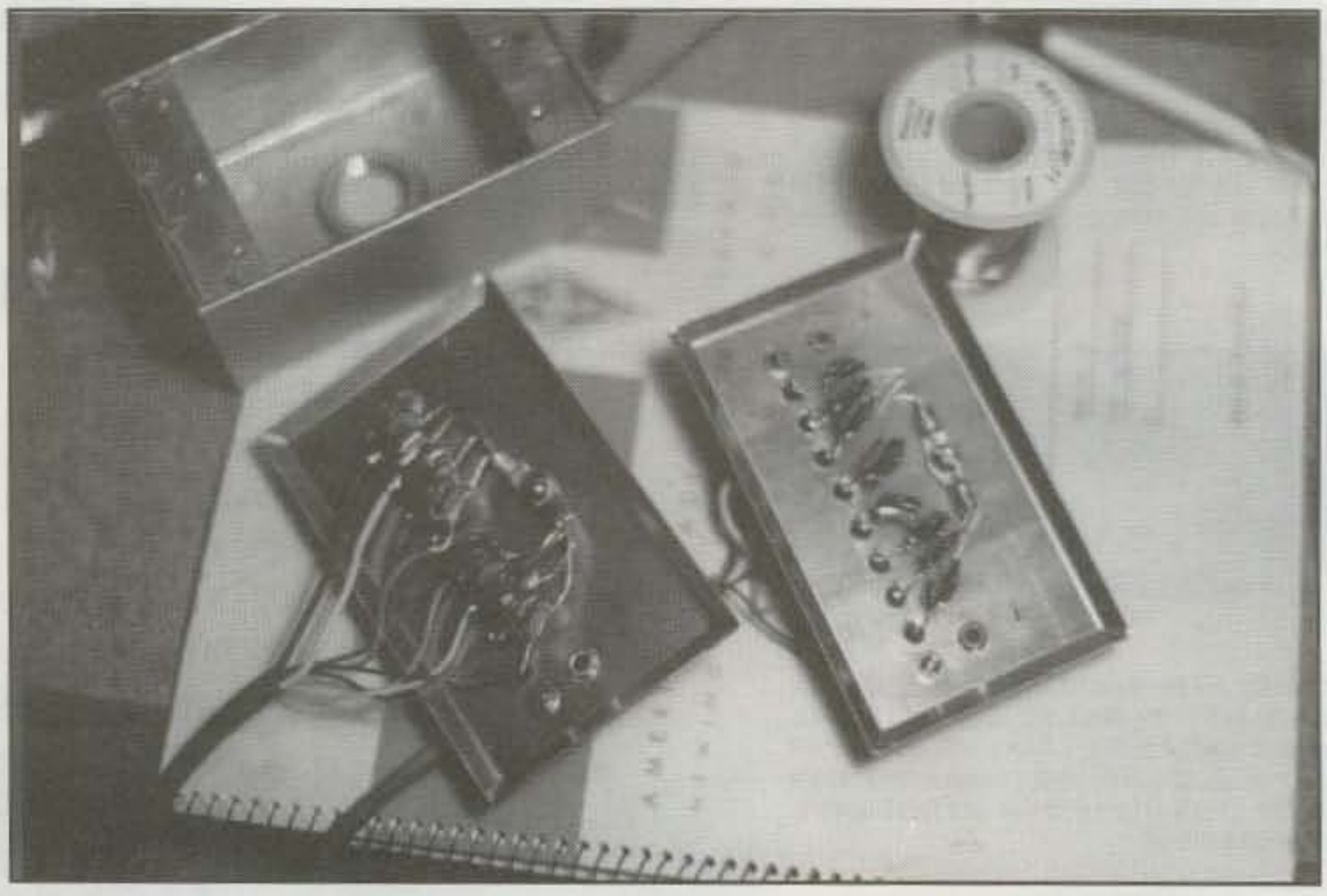
The average rotator cable consists of an 8-conductor unshielded cable. There are two problems to consider: First, you want to prevent RF from your antenna getting onto the rotator cable and being conducted back into your shack where it can cause all sorts of problems. Second, you want to protect your equipment from high-voltage transients that can get on the rotator wires from nearby lightning strikes or static buildup.

In order to solve these two problems, I placed MOVs for surge suppression and bypass capacitors for RF isolation across each of the eight rotator wires. Additionally, I wanted to place this protection right at the rotator, as well as at the point where the rotator cable enters my home.

The schematic shows the circuit. The bypass capacitors are .01 µF 500 volt Radio Shack capacitors (RS 272-131). The MOVs are the Thompson units described above. How do we build this into a weather-resistant box?

Poking around in the electrical section of my local hardware store, I found outdoor, weatherproof aluminum boxes that are meant for adding outside wiring to a home. The standard boxes have three 1/2 inch threaded holes (two of the sides have one hole each, and there is one hole in the back). Each box comes with hole plugs for two of the holes, and the price is less than $3.00. I also purchased a blank cover for around $1.00, which includes a weatherproof foam seal. Finally, for the 8-terminal strip I used a Radio Shack 274-653 chassis-mount feed-through barrier strip.

In my case I purchased two of everything, since I planned on a surge suppression box at both the antenna and the rotator cable entry



Interior view of both versions of the surge protector. On the left is the house-mounted version, and on the right is the tower-mounted unit. All components are wired and attached to the cover plate of the weatherproof box.

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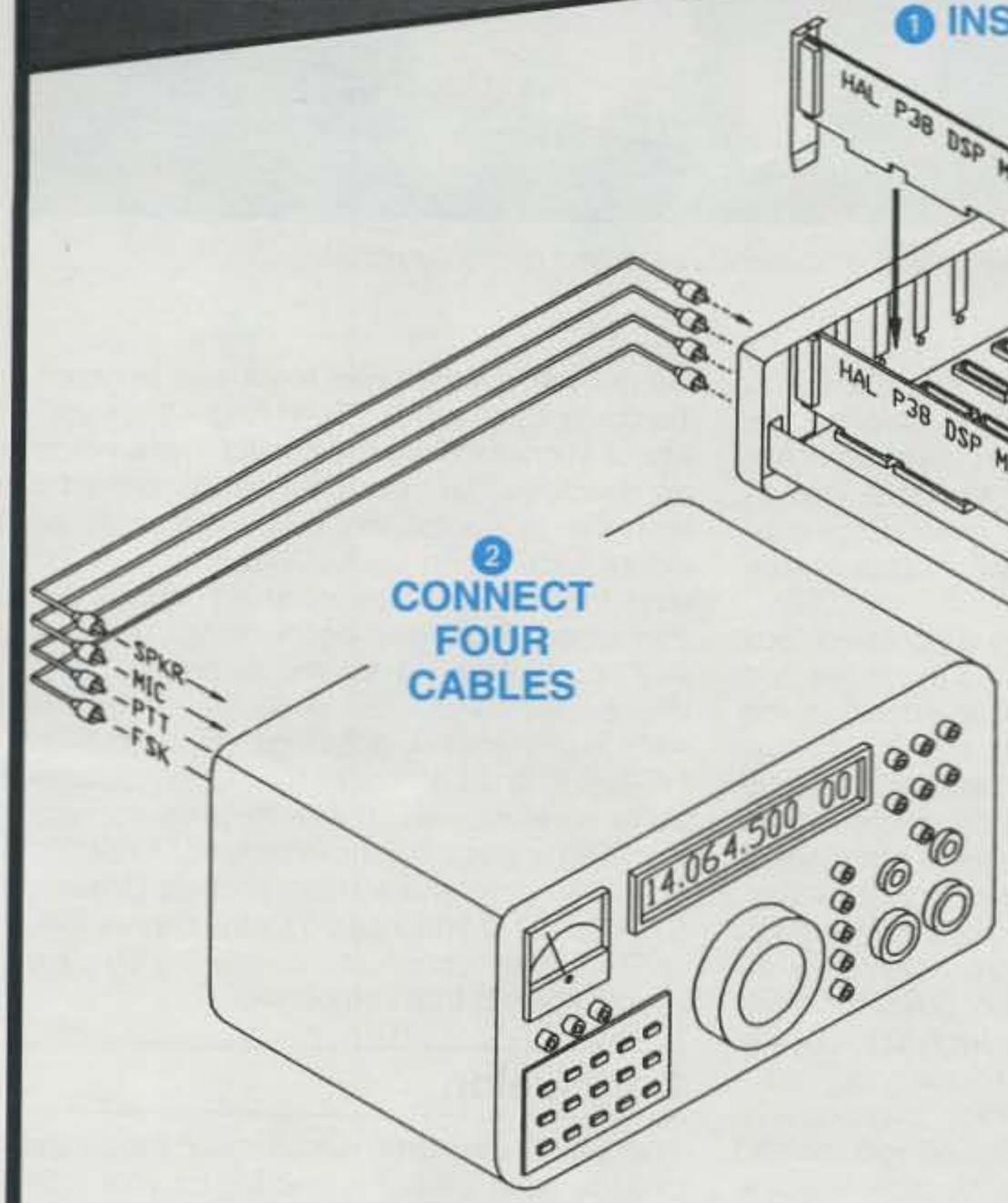

2 CONNECT FOUR CABLES

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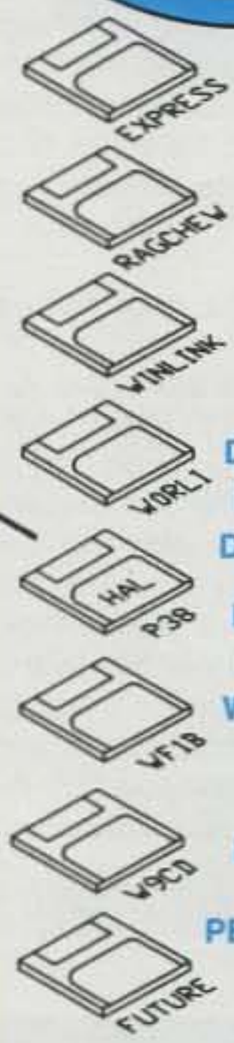

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point to my home. This entailed my purchasing a package of 1/2 inch plugs, since I had to plug all three 1/2 inch holes for the box at the antenna, and a weatherproofing seal which I mounted between the back of the surge suppression box and the wall of my home.

Construction

To build the unit, I first measured, marked, and drilled the holes for the 8-terminal strip mounting holes and feed through connections on the blank cover. I then mounted the 8-terminal strip with stainless-steel hardware. I also covered all cracks between the terminal strip and the cover with epoxy to weatherproof the cover. On the inside of the cover, I then wired the MOVs and 0.01 µF bypass capacitors between each terminal and ground. For the ground connection, I added a ground lug to the inside of the cover with a stainless-steel screw and nut. The threaded end of the screw should extend from the cover front to provide a ground-wire connection point for the house-mounted surge suppression box.

While the schematic of both surge suppression boxes is the same, the physical construction differs between the two. For the tower-mounted unit I plugged all three 1/2 inch holes in the main box. Then I drilled a 3/8 inch hole in the back of the box and mounted a 3/8 inch bolt to the box with the threaded end extending out of the box. The bolt is held in place to the box with a 3/8 inch lockwasher and nut (use stainless-steel hardware to prevent corrosion). I then used this bolt to mount the surge suppression box to the tower with another 3/8 inch lockwasher and nut. A short cable from the rotator terminates in #6 spade lugs which attach to the 8-terminal strip on the tower-mounted surge suppression box. Another cable, terminated with #6 spade lugs on both ends, extends from the tower surge suppression box to the house-mounted surge suppression box.

The completed units are bolted in place and ready for installation.

The house-mounted surge suppression box is built a little differently. I wired the MOVs and capacitors as before (and as shown in the schematic). However, I soldered the individual wires of a 10 foot piece of rotator cable directly across the MOVs and capacitors. I then passed this short section of rotator cable through the 1/2 inch hole in the back of the box, through the weather proofing seal, and through the wall of the house, where I ultimately attached it to the rotator control box. I mounted the house-mounted surge suppression box to the wall of the house with masonry screws. I then attached a heavy (#6) ground wire between the box and a ground rod located close to the box. I attached the cable from the tower-mounted surge suppression box to the screw terminals on this house-mounted box.

I put the weatherproof foam seal between the cover and the box. (Don't forget this step.) Also, I connectorized the control cable inside my shack so that I could easily disconnect it from the rotator control box. I also built an indoor terminating socket that shorts all the wires together when the incoming cable is disconnected. For these connectors I used an AMP 8-pin housing for the incoming cable (Mouser 571-14803450 @ $0.48 each), and AMP 8-pin socket housings (Mouser 571-14802830 @ $0.56 each) for the rotator controller connector and the terminating connector. I also used eight pins (Mouser 571-606201 @ $0.13 each) and sixteen sockets (Mouser 571-606191 @ $0.13 each) for the connectors.

The system schematic diagram shows the overall hookup that I employed.

Conclusion

That's it. These surge suppression boxes will provide quite a bit of protection for your rotator cable for around $10 each and a few hours of work. Not a bad investment! ■

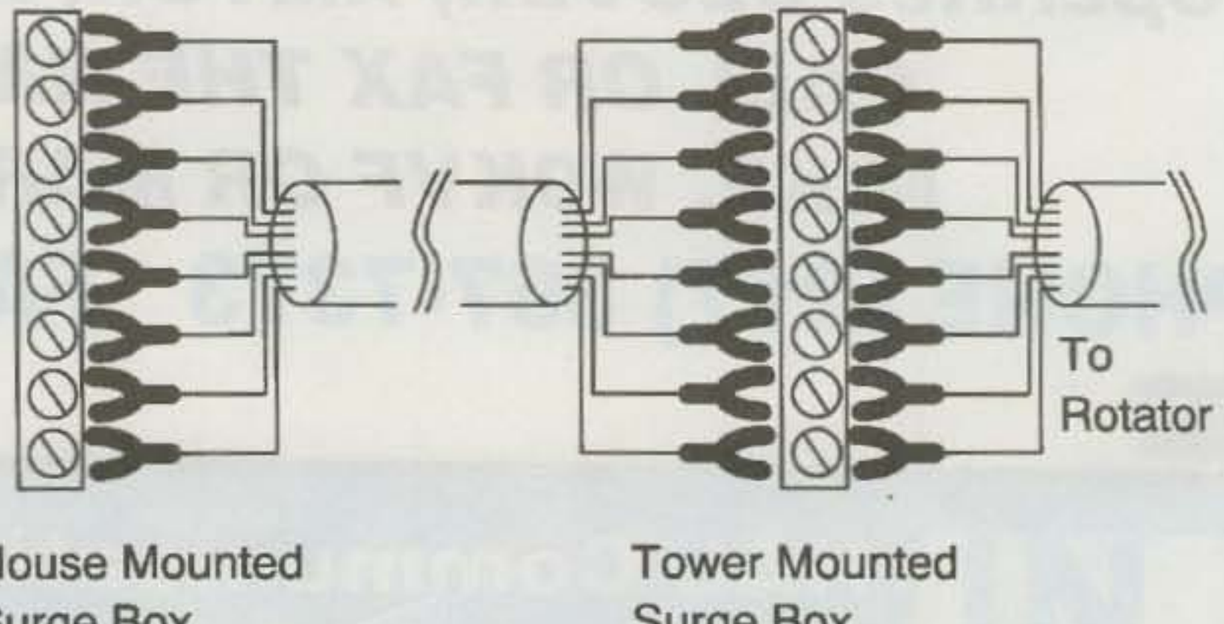

Fig. 2– The simple point-to-point wiring diagram.

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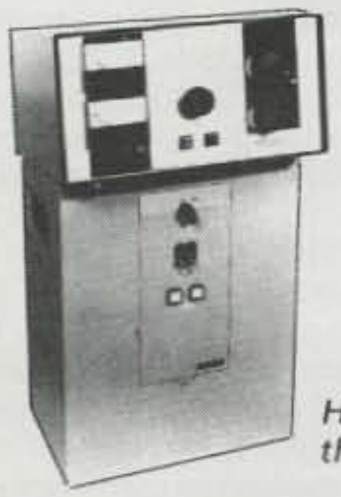

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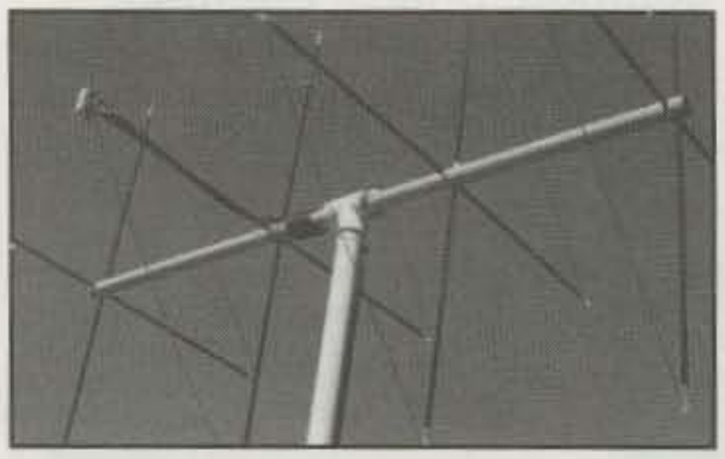


Cubex "Yellowjacket" Antenna

The Cubex Antenna Company is now offering the "Yellowjacket," a 2 meter 4-element quad antenna with all fiberglass construction. The antenna is pre-tuned to provide less than 1.7:1 SWR across the 2 meter band. There is nothing to adjust and the system is directly coax fed. It can be rotated for horizontal or vertical polarization and uses a 42 foot boom. Components can be assembled in the field without tools, with the exception of a pair of pliers to tighten the driven wire element.

The "Yellowjacket" is available from Cubex for $34.95 FOB Brea, California, plus shipping and handling. For more information, contact Cubex Antenna Company, 2671 Saturn St., Unit E, Brea, CA 92621 (phone 714-577-9009; fax 714-577-9124); or circle number 106 on the reader service card.

New Ham Radio Software From Milestone Technologies

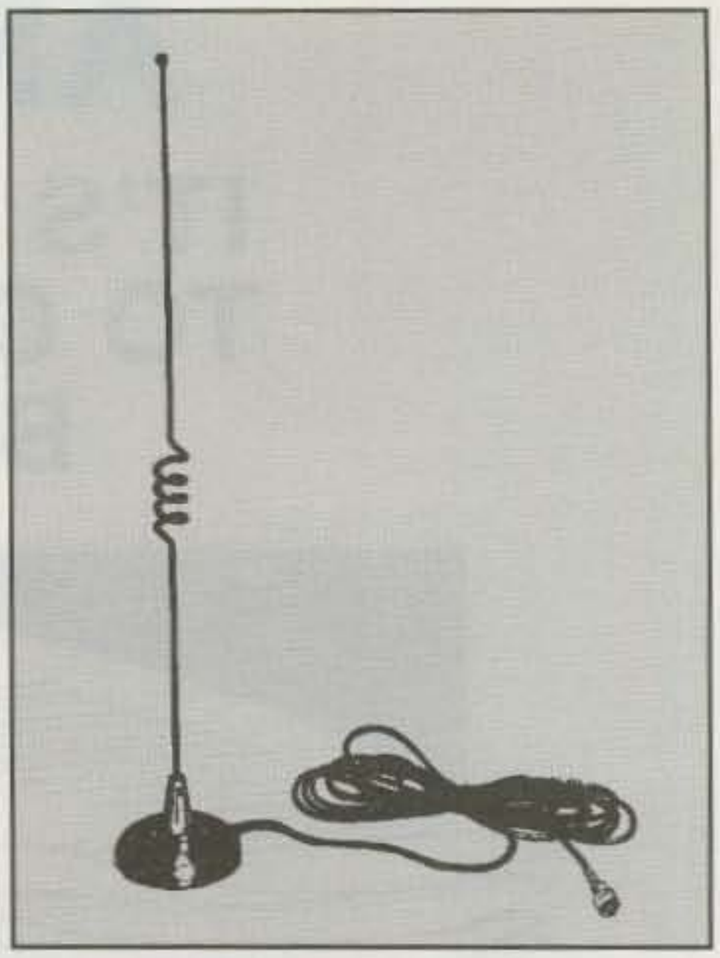
Milestone Technologies has announced the release of M*LOG™, a new general-purpose radio log-keeping system for DOS-based PCs. The software is based on Milestone Technologies' LOGMASTER II, but has been completely rewritten utilizing new compiler technology. M*LOG also offers new features to automate log keeping and the QSL/confirmation process. Other new features include: automatic country look-up; six individual user-nameable fields; unlimited remarks or notes; access to popular callbook databases; and the ability to create "templates" for QSL data output and log reports. QSL data can be printed directly on cards or labels, or saved in a file in WordPerfect Merge or delimited ASCII text format.

M*LOG also provides customization features including user-definable default field values, screen colors, and function keys which can contain frequently used data such as station information. It offers equipment fields for rig, power, and antenna used; a country field, automatically filled in when you enter a callsign; four on-screen remarks fields of 60 characters each; six user-definable fields for state, county, affiliations, or any other data you want to track (15 characters each); and much more.

M*LOG requires an IBM-PC or compatible PC with at least 640Kb RAM, a single high-density diskette drive, and DOS 2.10 or later. It is priced at $34.95, with an upgrade price of $15 for registered users of Milestone LOGMASTER II. Priority shipping/handling is $5.00 per order. Credit card and COD orders can be placed by calling Milestone Technologies toll free at 800-238-8205. For more information about the M*LOG, CODEMASTER V, or Milestone's other products, contact Marshall, AAØXI, at 303-752-3382 or write to him at Milestone Technologies, 3140 S. Peoria Street, Unit K-156, Aurora, CO 80014-3155. E-mail via CompuServe (75230, 1405), the Internet 75230.1405@compuserve.com, or FIDONET 1:104/443. Or circle number 107 on the reader sevice card.

Lakeview Company Economy Dual-Band Antenna

Lakeview Company, Inc., "The Hamstick People," has introduced an Economy Dual Band Antenna. The EDB-1 and EDB-2 come pretuned for the center of the 2 meter band (146 MHz) and the 70 cm band (446 MHz). The antennas are 19 inches tall and are supplied with a black whip, and a powder-coated magnet, complete with 15 feet of RG-58 coax. A choice of PL-259 or BNC connector is available. A vinyl magnet pad is also included.



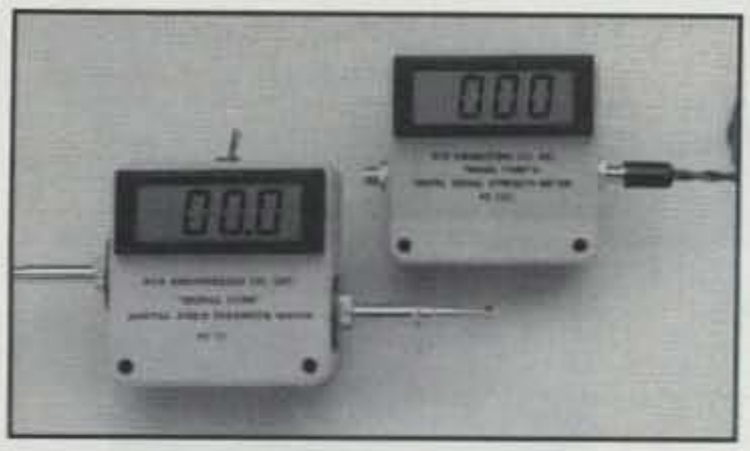
Both the EDB-1 for PL-259 connector and EDB-2 for a BNC connector are priced at $14.95 each. The antenna is also available in a whip-only version (EDBW-1) complete with 3/8 by 24 TPI adapter that fits most existing mounts for $8.95. For more information, contact Lakeview Company, Inc., 3620-9A Whitehall Rd., Anderson, SC 29624 (803-226-6990; fax 803-225-4565), or circle number 108 on the reader service card.

Universal VOX Switch From Azden

The Communications Division of Azden Corporation has announced the availability of a voice operated (VOX) switch model PTT-02. This device can give any radio the advantages of remote manual or voice-triggered transmission. Variable microphone gain, adjustable frequency equalization, and VOX gain are included. The PTT-02 is usable with all types of microphones including dynamic and electret. A removable belt clip, Velcro tape, and soft desk pad permit universal mounting. An OFF-PTT-VOX switch permits either normal push-to-talk or VOX operation. An adjustable (from 0 to +8 dB) 2 kHz gain control coupled with an overall gain control (0 to +10 dB) provides matching of most microphones to most radios as well as shaping the frequency response for improved DX operation.

The PTT-02 measures 2.4"W × .87"H × 3.35"D. A single 9 volt alkaline battery is used. Suggested price is $50. For more information, contact Azden Corporation, Communications

Div., 147 New Hyde Park Rd., Franklin Square, NY 11010 (phone 516-328-7500; fax 516-328-7506), or circle number 109 on the reader service card.



Nye Engineering's FS73C Digital "S" Meter

Nye Engineering can now supply the FS73 "Signal Cube"® R.F. Field Strength Meter in the form of a digital S meter, to be connected directly into the RF/IF section of a radio receiver. In this form, the FS73C will provide a higher resolution of signal strength than a conventional communications receiver type S meter.

The original product, the FS73 with the telescoping dipole-type antenna, is a calibrated RF field strength meter. The new model, the FS73C, when connected directly to a radio receiver is actually a digital signal strength or S meter. Each unit is available from Nye for $169 plus $5.00 shipping. For more information, contact Nye Engineering Co., Inc., 4020 Galt Ocean Dr., Suite 606, Ft. Lauderdale, FL 33308 (phone 305-566-3997; fax 305-537-3534), or circle number 110 on the reader service card.

"World of Ham Radio" CD-ROM From AmSoft

AmSoft has announced the release of its CD-ROM. "The World of Ham Radio" contains a collection of amateur radio software on a CD-ROM, and the most recent FCC amateur radio license database containing more than 850,000 callsigns. The current database includes calls issued up to August 7, 1995. Find hams by full or partial callsign, prior callsign, last name, first name, state, city or Zip Code. The user can create mailing lists or print single labels with the V5.0 FCC Callsign database program. Every issue comes with the AmCall auto-logging station logbook which uses this callsign database.

"The World of Ham Radio" is compatible with PK/KA Gold, LogMaster, AEA Log for Windows, and other amateur radio software packages. AmSoft has also added an amateur radio shareware and software library. This CD-ROM is operated by a front end called CDVIEW.EXE and users can preview new ham software directly from the CD-ROM without requiring a hard drive. Most of the software programs run direct from the CD-ROM. There are over 1350 amateur radio modification files arranged by manufacturer and model number. Windows '95 users can add the Callsign and CDVIEW programs with the Windows 95 Task Manager. DOS users can operate this CD-ROM from a DOS prompt. Solid operation under DOS/Windows/OS2 with "The World of Ham Radio."

"The World of Ham Radio" is available for a retail price of $39.00 plus $3 s&h US ($5 foreign). For more information, call 717-938-8249, or circle number 103 on the reader service card.

MATH'S NOTES

BY IRWIN MATH, WA2NDM

WHAT'S NEW AND HOW TO USE IT

Op-Amp Product Updates

Our column of a few months ago describing some of the newer components available for the experimenter stimulated a good deal of interest, so we have decided to repeat the performance this month by describing a few of the newer op-amps making their appearance on the market. These, to say the least, are a far cry from the old 741 and are incredible buys, considering their specifications.

First is a 100 MHz device from MAXIM that offers single supply operation all the way down to 2.7 volts. The MAX473 is a single op amp with a 3 dB point of 100 MHz, a slew rate of 15 volts per microsecond, and an output swing of 0.05 to 2.95 volts when operating from a 3 volt power supply. The device will drive a 600 ohm load with a few hundred picoFarads of capacitance to full output, has an open loop gain of 94 dB, and comes in a surface-mount package. At a cost of $1.45 in thousand quantity (probably a couple of dollars in single quantity), the unit is something for the experimenter to really look at. Dual and quad versions of the MAX473 are also available. Further information, as well as an op-amp/video design guide, is available from MAXIM Integrated Products, 120 San Gabriel Drive, Sunnyvale, CA 94086 (1-408-737-7600). Fig. 1 is a curve showing the output of this device with a 3 volt power supply as well as when driving a high-capacity load.

Not to be outdone, ELANTIC is offering a 125 MHz op-amp that also works down to 2.7 volts. This device does not operate to the rails, but will provide output levels from 0 to Vcc-1.2 volts. The EL2150 will deliver 60 ma into a 50 ohm load (100 ma into 10 ohms), however, and only requires 5 ma of current for the amplifier itself. Designed for video use, this op-amp offers a differential gain (linearity) figure of 0.06% and differential phase figure of 0.06 degrees, making it ideal for critical applications. Slew rate, by the way, is claimed to be 275 volts per microsecond. The unit comes in a standard 8-pin DIP as well as a surface-mount package. Another version with similar performance, the EL2157, also offers an ENABLE pin which can be used to reduce supply current to 0 ma in 25 nanoseconds for applications where supply current is critical during standby, such as when using batteries. Cost is $2.30 in thousand quantity and somewhat higher for a few pieces. Further details are available from ELANTIC, Inc., Milpitas, CA (1-408-945-1323).

Analog Devices has also joined the show with what they claim is the "fastest low-current op-amp available." The AD8011 only requires 1 milliampere of operating current from a 5 volt supply and sports a 300 MHz bandwidth. Slew rate is an amazing 2000 volts per microsecond, and settling time is 29 nanoseconds to 0.1%, making the unit an excellent choice for most high-speed or high-frequency applications. Video performance is also quite good

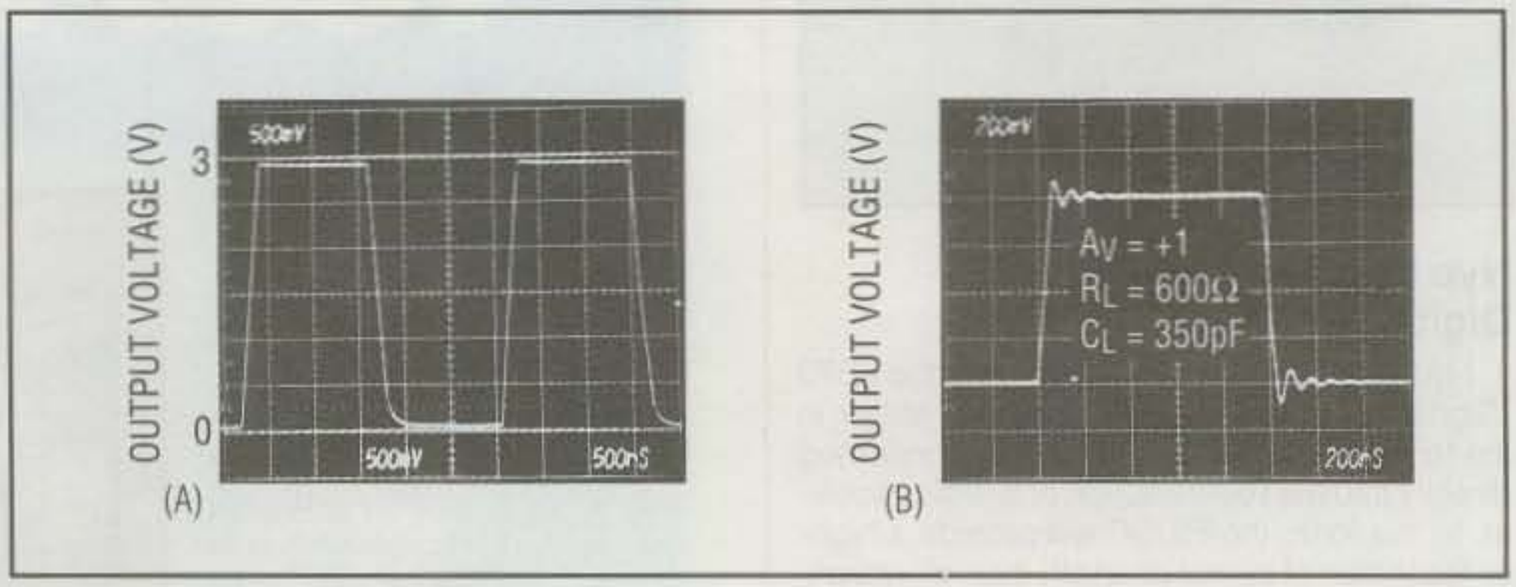


Fig. 1– Output swing (A) and pulse response (B) for MAX473.

with a differential gain figure of 0.02% and a differential phase figure of 0.06 degrees. Even the cost of $1.95 in thousand quantities (small quantities somewhat higher) is super.

Another inexpensive device from Analog is their AD8002. This unit is a dual 600 MHz current feedback op-amp with a differential gain specification of 0.01%, differential phase specification of 0.02 degrees, and slew rate of 1200 volts per microsecond while drawing only 5 ma per amplifier from a 5 volt supply. This device is primarily designed for driving multiple video loads, and fig. 2 is a schematic of a four-channel video driver that provides HDTV broadcast-quality performance. This circuit is ideal for configuring a low-cost video distribution system and should be of interest to the ATV enthusiast. If you build the circuit, just make certain that the 75 ohm impedance levels are maintained, and when you are not using one or more of the outputs, make sure they are terminated with a 75 ohm resistor or load. Cost for the AD8002 is $3.50 in quantities of a thousand pieces and somewhat higher in small quantities. Whoever thought that we would see the day when we could operate on the 432 MHz band with an op-amp?

Additional information on the AD8011 and AD8002 is available from Analog Devices, P.O. Box 9106, Norwood, MA 02062-9106.

The above is but a small sample of the newer op-amp devices making their appearance. Contacting the manufacturers will uncover additional "gems" for experimenting consideration. And we can only guess what other wonders lie in store for us as solid-state technology progresses.

73, Irwin, WA2NDM

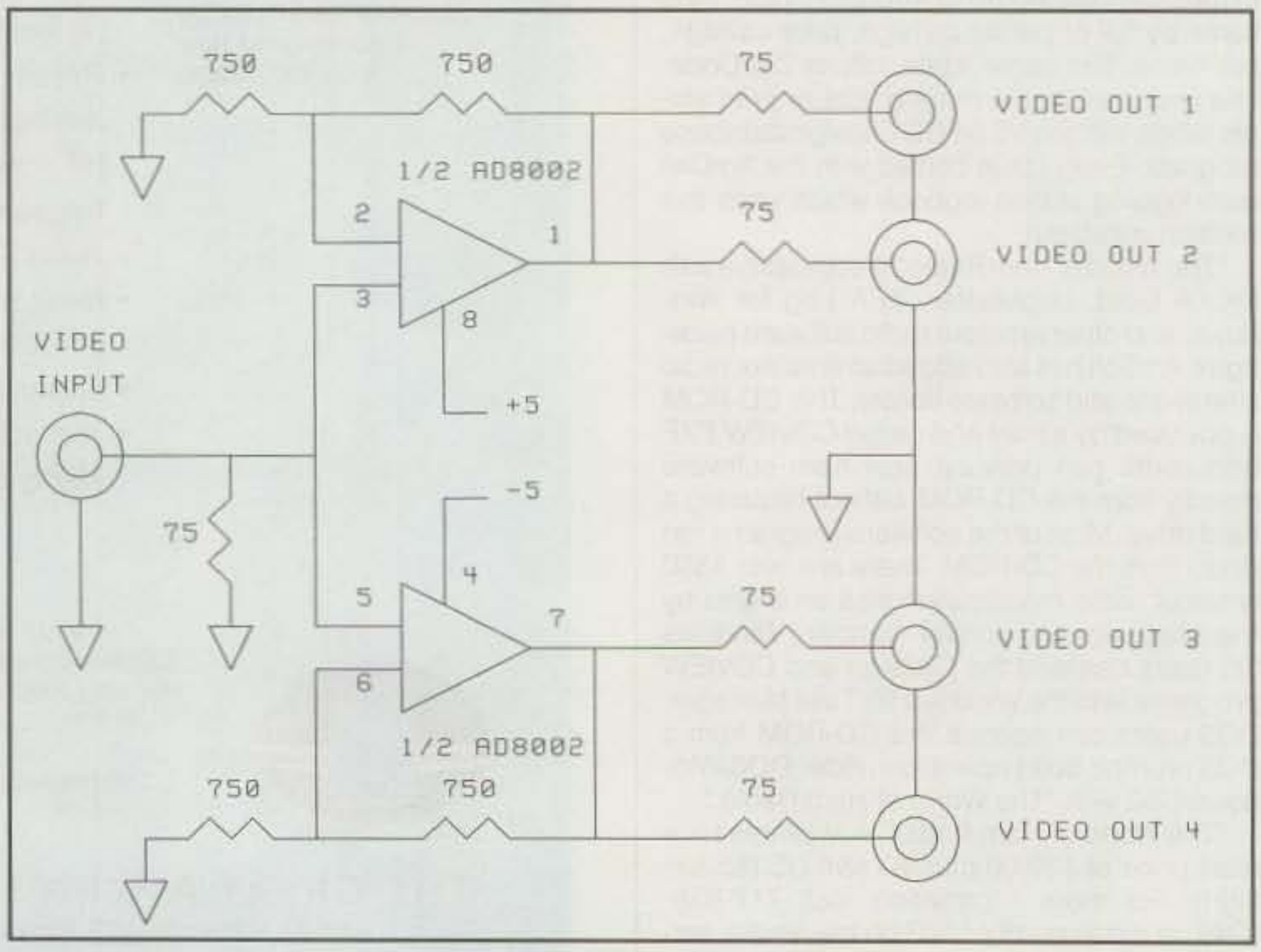


Fig. 2– Video driver using AD8002.

c/o CQ magazine

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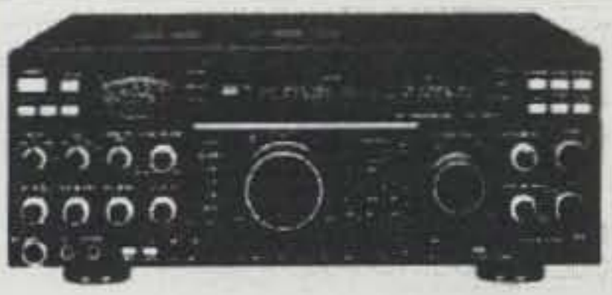

FT-1000MP

The New Yaesu FT-1000MP features ***Enhanced Digital Signal Processing (EDSP - a new multifaceted filtering technology unmatched in the Amateur Radio Industry).*** It also features dual in-band receive with separate S-meters, Collins 455kHz/2.75 kHz SSB mechanical filter buit-in and an optional Collins 455kHz /500hz CW mechanical filter. It also has a built-in electronic keyer, 100 watts of power, automatic antenna tuner, "Shuttle-Jog" enhanced tuning system, **transverter jack for VHF/UHF operation**, selectable antenna jacks, Cat System capability with built-in RS-232C Level Convertor, Wide receiver dynamic range, with separate, Optimized FET RF Preamplifiers for the High and Low bands, quick memory bandk system for instant recall of important memory channels, two VFO knobs for dual in-band receive, lighweight switch-mode AC power supply built-in, New High-Resolution DDS Tuning (Synthesizer steps as small as 0.625hz, Selectable cascaded Crystal and Mechanical Filtering, Independent 2nd & 3rd IF Filter Selection, Custom Feature Configuration via Menu SYSTEM. **CALL TODAY AND ORDER YOURS!**

FT-1000D

Features include:
Direct Digital Synthesis (DDS), two ten-bit DDS plus three eight-bit DDS for fast lock-up time and lower noise than other traditional PLL systems.
High RF Power Output, continuously adjustable output from 20 to 200 watts.
Dual Receive, allows simultaneous reception of two different frequencies utilizing two tuning knobs for easy spotting.
100 Memories, a detented rotary selector can be independently tuned for mode or IF filter selection can be changed directly like a VFO.
Digital Voice Storage (DVS-2), option provides instant playback of 16-second receive memory, plus two 8-second "CQ Contest" messages on transmit.
Automatic Antenna Tuner, built-in quick response antenna tuner matches SWR up to 3:1.
IF Shift an Variable Bandwidth Controls provide intermediate bandwidths with adjustable center frequency for no-compromise interference rejection.

FT-900/AT

Yaesu's Newest HF transceiver with Detachable Head for those *hard to mount* mobile operations. Featured include Remote Front panel design, 100 W on SSB,CW,FM & 25W on AM, Full break-in on CW, adjustable keyer built-in, IF shift and 30db notch filter, (IPO)Intercept Point Optimization, Built-in noise blanker, speech processor. Options include MMB-20 ($30.00), MMB-62 controller MMB ($29.00), SP-6 ($179.00) BASE STATION SPEAKER, DVS-2 ($289.00) digital voice recorder, FP-800 ($289.95)AC supply, YH-77ST($55.00) HEADSET.

FT-990

The ***Yaesu FT-990*** covers from 100KZ-30MHZ and operates all modes (SSB,CW,FSK,AM,FM). It also includes the **ATU-1 automatic antenna tuner,** AC power supply built-in, MH-1B8 hand mike, 100 watts adjustable power output. ***The FT-990 utilizes multiple DDS (direct digital synthesizers)*** systems to synthesize frequencies. A magnetic rotary encoder works silently and smoothly tunes around the bands. The front Panel keypad provides 1-touch band selection, with two independent (A/B) VFOs for each band holding their own frequencies, modes, and IF bandwidth settings, and even clarifier offsets and repeater shifts, if used. Switching bands instantly recalls all of these settings last used on each band. **Fifty tunable memories Plus Many, Many more Features!**

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CIRCLE 9 ON READER SERVICE CARD

CQ REVIEWS:

The Kenwood TS-870S Transceiver

BY LEW McCOY*, W1ICP

Many times in my career I have been called upon to review new equipment. Often the units I am asked to review fit into the same category (such as transceivers), and in that case they have similar "bells and whistles." To be very honest, most of the major manufacturers have excellent units, and it frequently is difficult to separate outstanding features. In the case of the new Kenwood TS-870S transceiver, however, this is not the case. To my way of thinking, digital signal processing (DSP) has finally arrived with this new transceiver.

The Kenwood TS-870S transceiver.

First Impressions

The first TS-870S I received was from a very early production run, and consequently I did not get a manual. Like any amateur radio operator, I was anxious to try the unit, so I did what I'm sure no other amateur has ever done: I turned it on without having read the manual. After all, how could I go wrong if I only listened to the receiver?

I turned up the audio and figured out how to switch the unit to 20 meters. At first I did not hear any background band noise. I started to tune and wham! An S9 signal popped up, and he was loud and strong. When I tuned away, the band sounded extremely quiet. Finally I started to tweak a few of the knobs that control the digital filtering, and that was when I really got a surprise. The display of the receiver showed that tweaking one filter knob resulted in the bandwidth of one portion of the filter going from 6000 cycles down to 1400 cycles. I then set the control at 2100 cycles, as I calculated this would be a good bandwidth for SSB reception. As I tuned between signals, I noted the band was quiet. Obviously, the filter was reducing random noise appreciably. It was apparent to me that the digital filtering produced exceptional skirt selectivity. The stated rating is 60 dB on the skirts, and such certainly was the case.

Technical Editor, CQ, 1500 W. Idaho St., Silver City, NM 88061

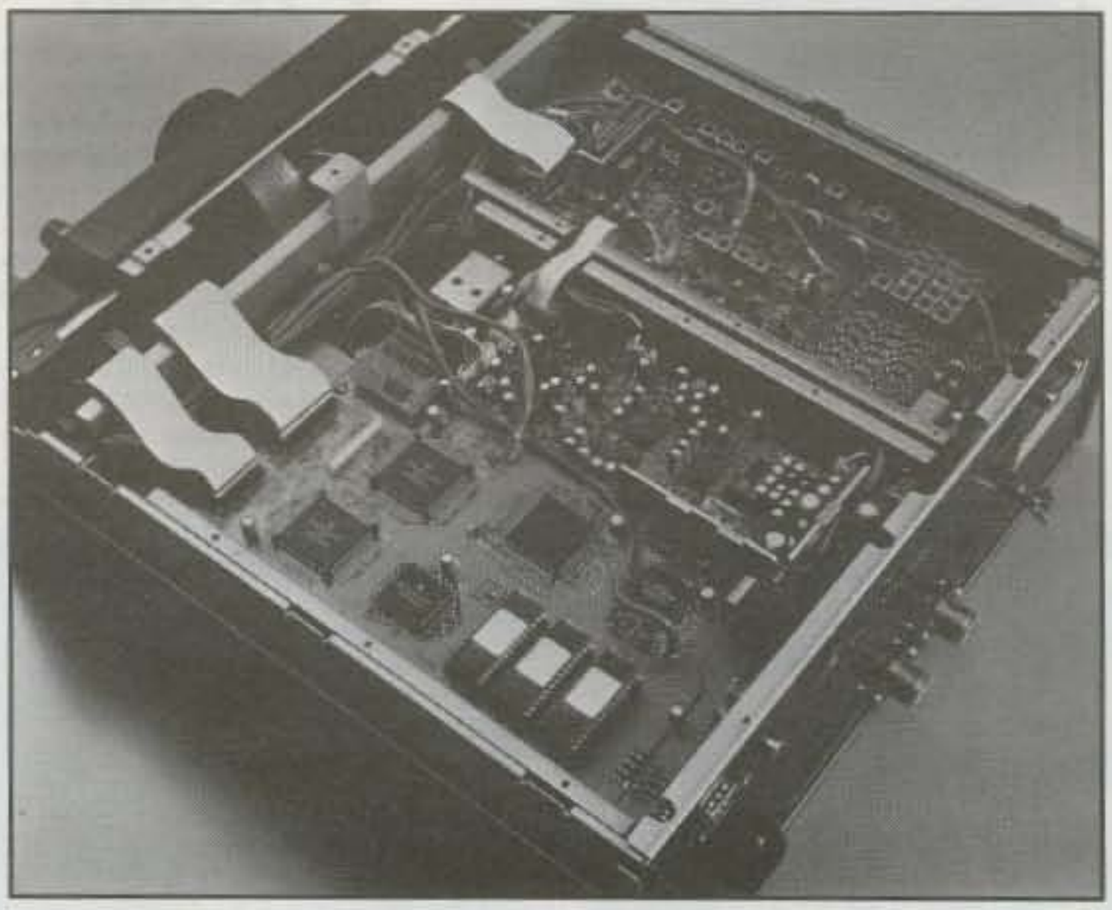
CW Filtering

My next step was to test the CW filtering. However, before describing that, let me give you just a little history on the subject.

Years ago (back in the 1960s) I worked at the ARRL in the Technical Department. Byron Goodman, W1DX, was one of my bosses, and he had become interested in the "limits" of selectivity. He built up a multiple IF (intermediate frequency) strip to test selectivity. He kept making his receiver setup more and more selective, until he reached a point where a signal had so much "ringing" that it was no longer good copy. That point was 180 cycles. It was shortly after that when the commercial receiver people set 200-cycle filters as the maximum standard. Such filters were never standard equipment, but always cost a bundle as an add-on. Just ask any Collins equipment users. That brings us to digital signal techniques.

I switched the TS-870S to CW and started to listen to CW signals. The digital filter could be adjusted to a setting of 50 cycles! I found two fairly strong signals that were almost on exactly the same frequency. I then went to careful tuning and found that I could easily separate both signals—and I do mean easily.

There are two tuning rates. The slowest is



← *The TS-870S with the bottom cover removed.*

Rear view of the Kenwood TS-870S. ↓

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ALS-600
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(*Includes* AC Power Supply)

- **Instant bandswitching, no tuning, no warm up** -- just turn on and operate
- **Output Power** -- 600 Watts PEP, 500 Watts CW
- **Continuous Coverage** -- 1.5 to 22 MHz; 10/12 Meters with easy-to-install optional kit, $29.95 plus s/h
- **SWR Protection** -- prevents amplifier damage if you switch to wrong band, use wrong antenna or have high SWR
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- **Front Panel ALC Control** -- *exclusive* Ameritron feature -- convenient front panel control lets you adjust your output power
- **Transmit, ALC, SWR LED indicators** -- keeps you informed
- **12 VDC output jack** -- lets you power low current accessories
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- **Illuminated** Cross-Needle Meter monitors voltage and current of 50 VDC line
- **Extremely** quiet fan
- **Very compact** 6 x 9 ½x12 inches -- can be placed conveniently out-of-way
- **Wired for 120 VAC,** supplies 50 VDC at 25 amps to ALS-600 amplifier
- **Also** use on 100-130 VAC and 220-250 VAC, 50/60 Hz
- **Draws** less than 12 amps at 100 VAC and less than 6 amps at 230 VAC
- **Includes prewired cable** to plug into ALS-600 amplifier
- **Made in USA**

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- **Mobile *no tune* Solid State Amplifer** -- uses four rugged 2SC2879 high power linear RF power transistors
- **Instant bandswitching, no tuning, no warm up** -- just turn on and operate -- makes mobile QSOs safer
- **Very Compact** -- just 3½x9x15 inches -- fits in nearly any mobile installation; weighs only 7 pounds, that's less than some mobile HF transceivers
- **Extremely quiet** --quiet low speed, low volume fan stays off and silent until temperature rises
- **Output Power** -- 500 Watts PEP, 400 Watts CW
- **Continuous Coverage** -- 1.5 to 22 MHz; 10/12 Meters with easy-to-install optional kit, $29.95 plus s/h
- **Load Fault Protection** -- disables and bypasses amplifier if antenna has excessively high reflected power or if bandswitch is set lower than exciter frequency -- virtually eliminates damage because of operating error; has Load Fault LED indicator
- **Thermal Overload Protection** -- disables and bypasses amplifier if temperature is excessively high; automatically resets when temperature drops to safe level; has Thermal Overload LED indicator
- **Excellent harmonic suppression** -- multiple section output network and push-pull output circuit gives excellent harmonic suppression
- **DC current meter** lets you monitor collector current
- **ON/OFF Switch**-- bypasses amplifier for "barefoot" operation without having to disconnect high current power supply cables
- **Remote ON/OFF Control** -- lets you remotely control ON/OFF function for out-of-the-way mounting of amplifier
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Menu No.	Menu Item	Function	Selections	Default	Page Ref.
00	MENU.A/B	Menu A or B selection	A/B	A	24
01	AUT/MAN	AGC mode: Manual (OFF), Automatic (ON)	OFF/ON	OFF	44
02	AGC SSB	Automatic AGC release time for SSB mode • 1 (Slow) → 20 (Fast)	OFF, 1 ~ 20	7	44
03	AGC CW	Automatic AGC release time for CW mode • 1 (Slow) → 20 (Fast)	OFF, 1 ~ 20	12	44
04	AGC FSK	Automatic AGC release time for FSK mode • 1 (Slow) → 20 (Fast)	OFF, 1 ~ 20	14	44
05	AGC AM	Automatic AGC release time for AM mode • 1 (Slow) → 20 (Fast)	OFF, 1 ~ 20	5	44
06	AF.AGC	AF AGC release time for FM and AM modes • 0: Slow, 1: Med, 2: Fast	0/ 1/ 2	1	44
07	AF.AGC.LV	AF AGC level for FM and AM modes • 0: OFF, 1: Min, 2: Med, 3: High, 4: Max	0/ 1/ 2/ 3/ 4	1	44
08	RX AT	Auto Tuner active while receiving	OFF/ON	OFF	49
09	P HOLD	Peak Hold for multifunction meter	OFF/ON	ON	22
10	Δ FREQ	TX/RX frequency difference for split operation	OFF/ON	OFF	43
11	AIP.GAIN	S-meter correction for AIP (excluding FM/AM)	OFF/ON	OFF	10, 53
12	FM.S-MET	S-meter correction for FM mode	OFF/ON	ON	38
13	LINE.ENH	Line Enhance function	OFF/ON	ON	53
14	LINE.ENH	Line Enhance response time • 0 (Fast) → 4 (Slow)	0/ 1/ 2/ 3/ 4	4	52
15	SPAC	SPAC time	2/ 5/ 10/ 17 ms	17 ms	53
16	SP.BEAT	Beat Cancel response time • 0 (Fast) → 4 (Slow)	0/ 1/ 2/ 3/ 4	2	52
17	SP.NOTCH	Auto Notch response time • 0 (Fast) → 4 (Slow)	0/ 1/ 2/ 3/ 4	2	52
18	TRACK	Adaptive filtering	OFF/ON	ON	52
19	PKT.FIL *Note: While operating in SSB mode, the following is displayed in each case:* *1200: P.FIL.WID* *300: P.FIL.NAR* *P: P.FIL.PSK*	Filter bandwidth for digital operation • OFF: Bandwidth selectable via **LO/WIDTH** and **HI/SHIFT** controls • 1200: For wide shift "P.FIL.WID" displayed while operating. • 300: For narrow shift (2310 or 2110 Hz, 200 bps) • P: For PSK modems	OFF/ 1200/ 300/ P ***Note:** For SSB and AM modes, **LO/WIDTH** and **HI/SHIFT** controls are enabled, and the filter bandwidth is displayed, only when "OFF" is selected.*	OFF	41
20	PKT.IN	AF input level for Digital operation (MCP/TNC TX) • 0: 100 mV, 1: 30 mV, 2: 10 mV	0/ 1/ 2	2	41
21	PKT.OUT	AF output level for Digital operation (MCP/TNC RX) • 0 (minimum level) → 9 (maximum level)	0 ~ 9	4	41
22	MIC AGC	Microphone AGC release time • 0: Slow, 1: Med, 2: Fast	0/ 1/ 2	1	47
23	CW RISE	CW rise and decay times	2/ 4/ 6/ 8 ms	4 ms	31
24	PITCH	CW RX pitch/ TX sidetone frequency	400/ 450/ 500/ 550/ 600/ 650/ 700/ 750/ 800/ 850/ 900/ 950/ 1000 Hz	800 Hz	30
25	PROC.LOW	Speech Processor low-frequency response	–6, –3, 0, +3, +6 dB	–3 dB	23, 46
26	PROC.HI	Speech Processor high-frequency response	–6, –3, 0, +3, +6 dB	+3 dB	23, 46
27	TX INH	TX Inhibit	OFF/ON	OFF	45

Fig. 1– This is a page from the manual showing some of the MENU functions.

1000 cycles per revolution, which is adequate to separate signals with the filters in the sharpest position. The fastest rate is 10 kHz per revolution. I also might add here that we have had DSP for some time now, but most of it has been done at audio. This processing on the TS-870S takes place in the intermediate frequency (the IF). Needless to say, I am very impressed.

The Basics

So what are some of the basics of the transceiver? It measures 4.75"H × 13"W × 13"D. Power requirement is 13.8 volts at 23 amps, and must be supplied. The display is arranged so that all information is visible, either during operation or via switches.

The S meter has the unusual feature of showing the filter passband width in the form of a rainbow arc. The wider the passband, the larger the arc. In the 50-cycles position mentioned earlier, the arc consists of only three bars. While receiving, you have the bar-type S meter. This also is unusual in that as the signal being received shifts up and down, as in sideband reception, a single bar segment is left visible at the peak of signal strength. It is easy to tell the other operator you are working exactly what his received signal peak is. While transmitting, the meter serves as a calibrated power meter plus an ALC meter, an SWR meter, or a speech-processor compression meter. A PEAK Hold function which holds each reading for about 2.5 seconds can be activated. Also while transmitting, a calibrated power reading and ALC reading are available. In addition, either SWR or speech compression is shown.

I don't ever recall seeing for any transceiver as complete an operating manual as is provided with this unit. The book is 98 pages in length with large, clear print, and is extremely detailed. If anything, this transceiver is not a piece of equipment you will understand completely in one reading of the manual. True, you can get it on the air in about an hour, but from there you must be prepared to spend several hours reading the manual to obtain a good grasp of all the functions. Think I'm kidding? Let's discuss the MENU features.

The Menu

This transceiver is menu driven. Fig. 1 is the first page of the menu information from the manual. You press a panel button, and the transceiver goes into the MENU mode. There are 68 different menu functions that can be programmed. I also have included a page from the manual (fig. 2), which shows the cross reference for menu functions. For example, under CW you can program the rise and fall decay times, the RX pitch, and the TX sidetone. I mentioned the PEAK Hold function, under DISPLAY. This can be set according to your needs.

I could go on and on, but there are pages and pages in the manual describing these functions. We obviously have entered a new world of transceivers. I might add that this DSP world is here to stay.

Back To The Basics

Getting back to the basics, the transceiver covers receive range 100 kHz through 30 MHz. Amateur band coverage is 160 through 10 meters. Modes include SSB, CW AM, FM, and FSK. There are four (!) IF stages—the first at 73.05 MHz, second at 8.83 MHz, third at 455 kHz, and fourth at 11.3 kHz. I'll be the first to admit I don't understand that fourth IF, but I couldn't find details in the manual. I assume that this low an IF was or is used in some way to handle the DSP functions, because the DSP is done at IF and not audio. In the radio, FM has double conversion, while all other modes have quadruple conversion. As if this isn't enough, getting back to the manual, fig. 2 is a page showing how to customize the transmit signal. You can "sharpen" your signal as you desire. Pretty neat, don't you think?

More On Filter Tuning

This is a kind of "jump around" review, so bear with me. Getting back to the filter tuning, which is done in the IF, we have a BEAT CANCEL switch, which when turned on, will knock someone who is tuning up near your desired station out of the passband. Nice!

Next, we have AUTO NOTCH, which may or may not work better than the BEAT CANCEL for a given situation. You can change MENU No. 17 for response times for the AUTO NOTCH. As the manual instructs, experiment and listen. I did and I was amazed.

The RCP Computer Program

The manual also provides details for RS-232C computer connection, and Kenwood has software available. This software is called "The

CUSTOMIZING TRANSMIT SIGNAL CHARACTERISTICS (SSB/AM)

The quality of your transmitted signal is important regardless which on-the-air activity you pursue. However, it's easy to be casual and overlook this fact since you don't listen to your own signal. The following sub-sections provide information that will help you tailor your transmitted signal.

■ Changing Transmit Bandwidth

Transmit bandwidth is modified via Menu No. 29 (TX.WIDTH). The available selections include:

- 1800, 2000, 2300, 2600, and 3000 Hz

The default is 2300 Hz. Consult the Bandwidth/ Bandshift Table for additional data. When the Speech Processor is switched ON, the bandwidth changes as shown in this table; however, displayed values do not change.

■ Transmit Bandshift

Transmit bandshift is modified via Menu No. 30 (TX.SHIFT). The available selections include:

- 0, 100, 200, 300, 400, and 500 Hz

The default is 300 Hz. Consult the Bandwidth/ Bandshift Table for additional data. When the Speech Processor is switched ON, the bandwidth changes as shown in this table; however, displayed values do not change.

■ Equalizing Transmit Audio

Press **[TX EQ.]** to toggle the transmit equalizer ON or OFF. To change transmit frequency characteristics, access Menu No. 31 (TX EQ.). The available selections include:

- High boost (H)
- Comb filter (C)
- Bass boost (B)

The default is High Boost.

■ Microphone AGC

While transmitting, Microphone AGC helps to prevent distortion due to overly high audio input. It is disabled while using CW or FSK.

Function	Menu No.	Selections	Default
Microphone AGC Release Time	22	0: Slow 1: Med 2: Fast	1: Med

BANDWIDTH/ BANDSHIFT TABLE

Speech Processor: OFF			Speech Processor: ON	
TX Bandshift Setting (Hz) (Menu No. 30)	TX Bandwidth Setting (kHz) (Menu No. 29)	Resulting Upper Cutoff Freq. (kHz)	New Lower Cutoff Freq. (Hz)	New Bandwidth (kHz)
0	1.8	1.8	200	1.6
	2.0	2.0		1.8
	2.3	2.3		2.1
	2.6	2.6		2.4
	3.0	3.0		2.6
100	1.8	1.9		1.7
	2.0	2.1		1.9
	2.3	2.4		2.2
	2.6	2.7		2.6
	3.0	3.1		2.6
200	1.8	2.0		1.8
	2.0	2.2		2.0
	2.3	2.5		2.3
	2.6	2.8		2.6
	3.0	3.2		2.6
300	1.8	2.1	300	1.8
	2.0	2.3		2.0
	2.3	2.6		2.3
	2.6	2.9		2.6
	3.0	3.3		2.6
400	1.8	2.2	400	1.8
	2.0	2.4		2.0
	2.3	2.7		2.3
	2.6	3.0		2.6
	3.0	3.4		2.6
500	1.8	2.3	500	1.8
	2.0	2.5		2.0
	2.3	2.8		2.3
	2.6	3.1		2.6
	3.0	3.5		2.6

Fig. 2– Also from the manual, this shows some of the adjustments for your transmitted signal.

Radio Control Program" (RCP). The system requirements are as follows: a 386/33 or higher computer, 3 MB of hard disk space, 4 MB of RAM, a Kenwood TS-870S transceiver, serial cable, DOS 5.0 or higher, and either Windows 3.1 or Windows 96.

The software has the following features: full-featured amateur radio CAD (computer-aided design) system, full set of radio assembly and layout tools, full Drag and Drop implementation, five sample radios, powerful RCP scripting language, Wizards for creating new custom controls, and on-line tutorial and documentation. All of the basic requirements for station operation are included for logging, timekeeping, etc. The software can control multiple transceivers; you contest guys think about that one!

Frankly, this review was done under some tight deadlines, and I did not have a chance to use the transceiver with software to its full potential. (However, I have no doubt whatsoever that it would work very well.) Suffice it to say, this setup with the transceiver and software brings amateur radio into a completely new era.

Conclusion

The transceiver has 100 memories, with SCAN, group or total, plus all the other functions you would normally expect in a first-class rig.

My conclusion should be obvious at this point. I consider the TS-870S to be a major milestone in the development of receivers and transmitters. It certainly will revolutionize our hobby. And I can see this being a very hot item with DXers and contesters. The selectivity characteristics alone make it stand out—in addition to the dual VFOs and weak signal reception capabilities—and the computer aspect certainly moves us into a different era in transceiver technology.

I could go on for pages and pages. I am sure you have many questions, but I'm sure Kenwood will fill you in through their advertising of the TS-870S.

The list price of the TS-870S is $3199.95. It is manufactured by Kenwood Corp., P.O. Box 22745, 2201 E. Dominguez St., Long Beach, CA 90801-5745 (customer support/ brochures 310-639-5300). ■

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Made with a special foam-filled fabric, it cushions blows, deflects scrapes, and protects knobs, meters and displays from harm.

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CQ Salutes:

Adam Weyhaupt, N9MEZ 1995 Young Ham of The Year

BY RICH MOSESON*, NW2L

What does it take to be named "Young Ham of the Year"? Listen to the people who nominated this year's winner:

"Adam does the work typically performed by an adult—and does each task well. He does this regularly in many ways, large and small, on a volunteer basis."—*Thomas R. Gibbon, W9EYB, Assoc. Dir. of Communications, U.S. Olympic Festival '94.*

"One would see Adam at work and realize this was a 14-year-old doing an adult's job . . . Adam stood out as being fully aware of the current situation and his environment. I was impressed with his obvious and extensive past experience with communication equipment and networks."—*Michael Dyer, President, U.S. Olympic Festival '94.*

"Although Adam is only 14 years old, he gave invaluable service to relief efforts during the Great Flood of 1993 by coordinating the efforts of amateur radio volunteers who provided communications assistance for the Illinois Emergency Management Agency and other agencies involved."—*Bill Ogle, NØAP, President, Macoupin Co. Amateur Radio Club.*

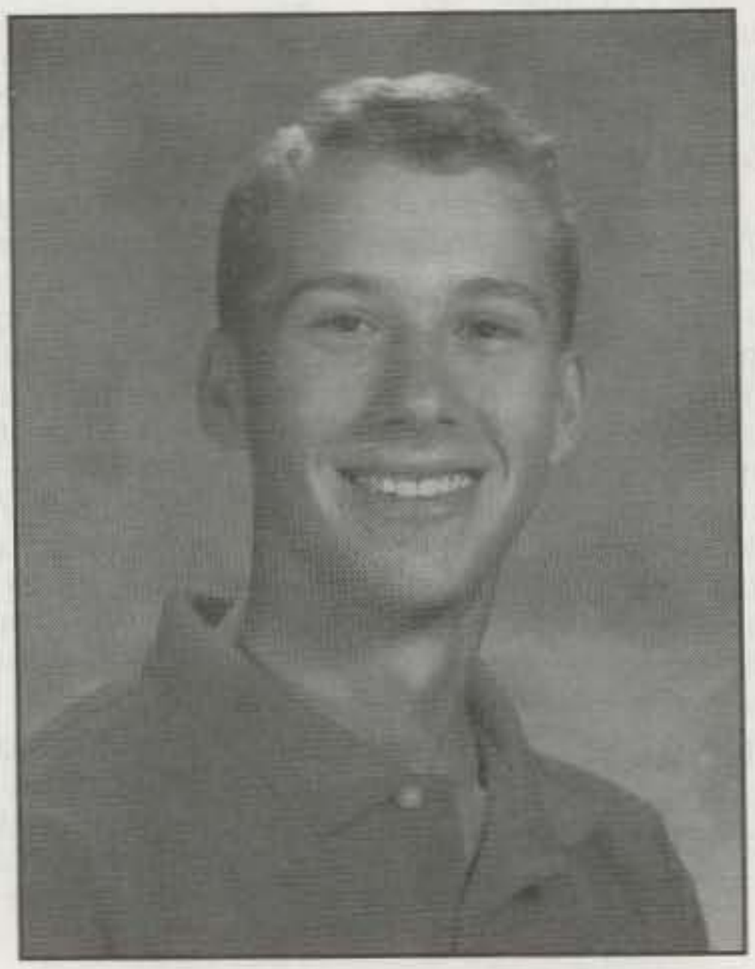
"His primary role as scheduling chief was one which many others, regardless of experience, could not have handled with the ease that he demonstrated. His age kept him from performing duties at the scene, but his expertise and manner allowed him to assist in any capacity he was called upon to handle."—*Lanny H. Darr, Director, Madison Co. Emergency Management Agency.*

"Adam continued to work until the project was completed. I feel that any boy at the age of 13 who carried out this assignment is worthy of this honor of "Young Ham of the Year."—*Lars Hoffman, Mayor, Godfrey, Illinois.*

Adam Weyhaupt, N9MEZ, is 15 years old and is already a veteran communicator and organizer for major-league emergencies and public-service events. A nomination for a *different* candidate noted that his nominee "hasn't had the opportunity to be involved in any one major or spectacular event, such as running a net during a major disaster. . . ." Adam *has* had that opportunity, not once but *twice*, and performed flawlessly each time.

Flood Control

When the Great Flood of 1993 struck America's midsection, Adam—then 13—took on the role of scheduling and coordinating amateur volunteers for relief efforts in and around his hometown. He worked through his entire summer vacation, from mid-June through the end of August, making sure enough amateurs were on hand to do what needed to be done. Madison County Asst. Emergency Coordinator Douglas Over, KA9HDZ, explains:



Adam Weyhaupt, N9MEZ, 1995's Young Ham of The Year.

"Adam's task was (to coordinate) the many communicators required to walk levees when communities were threatened, man the restricted areas when people were evacuated, staff the water supply points when the community's water supply plant was inundated, and assist with providing communicators for the American Red Cross feeding units that fed over 12,000 from our local kitchen. . . . With only occasional guidance from the Amateur Emergency Coordinator's staff, he generated enthusiasm and repeated response from a 150 mile radius."

Another Assistant Emergency Coordinator, Tod West, KB9AIL, noted that "it was refreshing to those of us attempting to cope with the seemingly insurmountable job of coming up with one or two more operators on very short notice to hear (Adam's) cheery 'no sweat,' even when we knew that the manpower barrel was tapped out. He was always able to find that one more warm body. Not once did we leave an essential position unfilled."

Adam was not only the chief scheduler for flood volunteers, but also very often the net control station. According to Ray Botterbush, KA9RLK, President of the Lewis & Clark Radio Club, "there were many nights during the summer of 1993 when he controlled successive nets on the same evening. . . . Adam was nearly omnipresent on the 2 meter repeater where flood control was active."

Olympic Efforts

Adam's work during the 1993 floods gave him the experience and training he needed to take on an equally challenging task the following summer—Administrative Assistant to the Communication Supervisor for the U.S. Olympic Festival '94, held in and around St. Louis, Missouri. The 15-day event was a "feeder" competition to help determine the membership of the United States teams at the 1996 Olympic Summer Games in Atlanta. Hams were called on to provide communications support for 3000 athletes competing in 35 different events at 25 different locations (venues), some as many as 90 miles apart.

Adam's responsibilities were complex, according to Associate Communications Director Thomas R. Gibbons, W9EYB. "Adam oversaw the Communication Center operation (and) did all that was needed to keep (it) operating efficiently. This involved coordinating many two-way radio systems (festival trunk network and talk-around; amateur radio network, local talk-around and venue talk-around; medical network and fire response network), sending and receiving alpha-numeric pages, message handling, learning the festival's (telephone switchboard), record-keeping, scheduling amateur radio and other communicators, maintaining a status board for venues, and on and on." Clearly, this was no small job.

The summer of 1995 was rather quiet around Adam's hometown of Alton, Illinois, so he took it easy—except for being a Skywarn spotter and net control, editing and publishing the regional Skywarn newsletter, and serving as Net Manager for his local Amateur Radio Emergency Service training net. This fall Adam entered his junior year in high school and plans to become a meteorologist, a decision he says was made in part because of his involvement in Skywarn, the National Weather Service's volunteer network.

Adam says his radio activities are exciting and fun. "I enjoy helping other people, but the frenzy and adrenaline rush of emergency communications is really fun!"

The Runners-Up

This year, for the first time, official recognition was given to the Young Ham of the Year award finalists as well.

c/o CQ magazine

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You get a lighted *peak* and average reading Cross-Needle SWR/Wattmeter with 200 and 2000 watt ranges. Its new directional coupler gives you accurate readings from 1.8 to 30 MHz.

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You get a super heavy duty current balun for balanced lines. It has two giant 2½ inch powder iron toroid cores and is wound with *Teflon®* wire connected to high voltage ceramic feedthru insulators. It lets you operate high power into balanced feedlines without core saturation or voltage breakdown.

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You get a lighted *peak* and average reading Cross-Needle SWR/wattmeter, antenna switch, 4:1 balun for balanced lines, 1.8-30 MHz coverage and a *full size* dummy load that easily handles 300 watts of abusive tune-up power.

New 8 position antenna switch lets you pre-tune into dummy load to minimize QRM.

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Use your barefoot rig now and have the capacity to add a 1.5 KW PEP amplifier later! Lighted Cross-Needle SWR/Wattmeter. *6* position antenna switch, *Teflon®* wound balun, ceramic feedthru insulators for balanced lines. 1.8-30 MHz. 10¾x4½x14⅞ in.

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Tunes coax, balanced lines, random wire 1.8-30 MHz. Cross-Needle Meter. SWR, *30/300 or 6 watt QRP* ranges. 6x6½x2½ in.

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The new MFJ-941E gives you a 300 watt PEP tuner with *lighted* Cross-Needle Meter. Covers 1.8-30 MHz.

Antenna switch selects 2 coax lines (direct or thru tuner), random wire, balanced line or external dummy load. 4:1 balun. 1000 volt capacitors.

2 Knob *Differential-T™* Tuner

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The MFJ-986 Differential-T™ 2 knob tuner uses a differential capacitor to make tuning foolproof and easier than ever. It ends constant re-tuning with broadband coverage and gives you minimum SWR at only one best setting. 3 KW PEP. 1.8-30 MHz.

Roller inductor makes tuning smooth and easy. Turns counter lets you quickly re-tune to frequency.

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MFJ's *mobile* Tuner

MFJ-945D **$99.95**

Don't leave home without this mobile tuner! Let the MFJ-945D extend your antenna bandwidth so you don't have to stop, go outside and adjust your mobile whip.

Small 8x2x6 inches uses little room. Lighted Cross-Needle SWR/Wattmeter with lamp switch. 1.8-30 MHz. 300 watts PEP. **Mobile mount**, MFJ-20, $4.95.

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The MFJ-906 has lighted cross-needle SWR/Wattmeter, bypass switch. Handles 100W FM, 200W SSB. For coax fed antennas. MFJ- 903, same as MFJ-906, less SWR/Wattmeter, bypass switch.

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MFJ-906 **$79.95**

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The MFJ-901B is our smallest --5x2x6 inches --(and most afford- able) 200 watt PEP tuner -- when both your space and your budget is limited. Great for matching solid state rigs to linear amps.

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Operate all bands anywhere with any transceiver with the MFJ-16010. It lets you turn a random wire into a transmitting antenna. 1.8-30 MHz. 200 watts PEP. Ultra small 2x3x4 inches.

MFJ-16010 **$39.95**

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MFJ-921 covers 2 Meters/220 MHz. **MFJ-924** covers 440 MHz. SWR/Wattmeter. 8x2½x3 in. Simple 2-knob tuning for mobile or base.

MFJ's *artificial* RF Ground

Creates artificial RF ground. Elimi- nates or reduces RF hot spots, RF feedback, TVI/RFI, weak signals caused by poor RF grounding. Also electrically places a far away RF ground directly at your rig by tuning out reactance of connecting wire.

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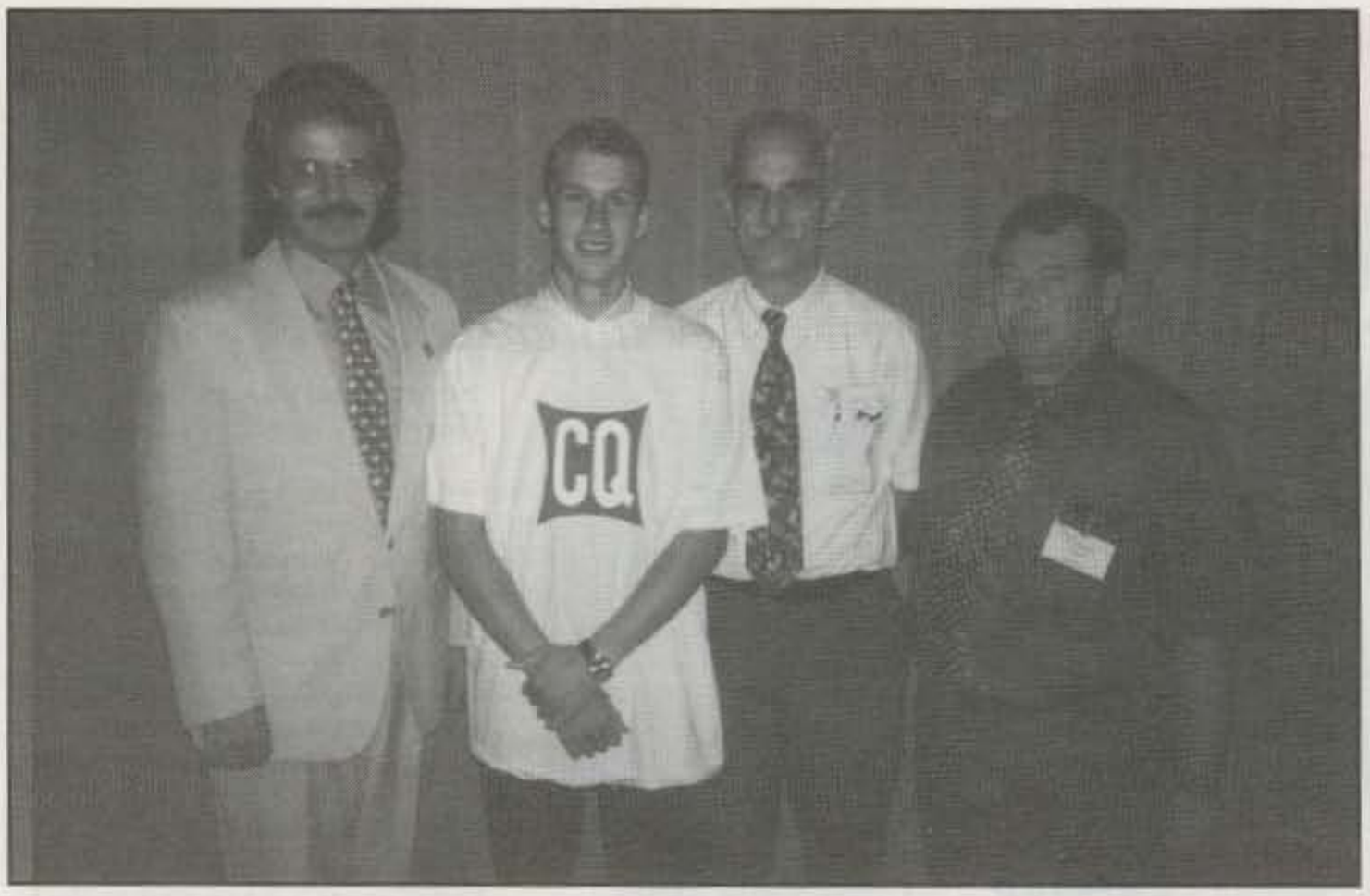

Adam was presented with the Young Ham of The Year award at the Huntsville Hamfest in August. Left to right are Chip Margelli, K7JA, of Yaesu USA; Adam Weyhaupt, N9MEZ; CQ Advertising manager Arnie Sposato, N2IQO; and Newsline Producer Bill Pasternak, WA6ITF. Newsline, Yaesu, and CQ co-sponsor the Young Ham of The Year award.

Eighteen-year-old Bryce Duncan, NØYDI, completed his Eagle Scout requirements by designing and supervising the construction of a new emergency communications facility at his local Red Cross headquarters in Red Wing, Minnesota. Every prospective Eagle Scout must plan and coordinate a community service project in order to attain Scouting's top rank. Bryce is also active in the Civil Air Patrol and, like Weyhaupt, is a trained Skywarn weather spotter.

Toby Metz, KB7UIM, age 14, is also using amateur radio as a key element of his Eagle Scout service project. He is teaching amateur radio to hearing-impaired students at the Idaho School for the Deaf, and he is organizing the construction of a computerized packet radio station at the school. His work there has been recognized by Miss America, Heather Whitestone, who is deaf.

Also, during the 1994 Jamboree on the Air (an annual amateur radio and Scouting event) Toby ran a youth net from an encampment of 600 Boy Scouts. He organized the participation in the net of former astronaut Dr. Tony England, WØORE, the Lieutenant Governor of Idaho and the Chief Scout Executive of the United States. He also linked the net, via phone patch, to Boise, Idaho's sister city, Chita, Russia, where the mayor and 50 Russian children took part. Toby's radio club, the Voice of Idaho, is continuing this Russian connection.

Honorable Mention

There were many other excellent nominations received as well, several of which cited instances of young people pitching in and helping out in emergencies. Fourteen-year-old Jessie Terry, AC6NB, served as a net control station during floods and landslides in California this past winter. And Nathan Jeffries, KI7QT, age 17, helped lead the amateur communications efforts in support of teams battling forest fires in Washington state in the summer of 1994.

CQ and YHOTY

CQ magazine this year became a corporate co-sponsor of the Young Ham of the Year award, which is now in its tenth year of recognizing the accomplishments of young people in amateur radio. The award was originated in 1985 by Bill Pasternak, WA6ITF, who was then editor of the weekly "Westlink Report." Several years ago Yaesu USA became the award's corporate underwriter. It continued to be sponsored by "Westlink" until the newsletter ceased publication earlier this year. Pasternak, who has remained involved with the award since its inception, brought it under the umbrella of his "Amateur Radio Newsline" audio news service and sought additional support from *CQ*.

The qualifications of all of the nominees were impressive. *CQ* publisher Dick Ross, K2MGA, noted that "the accomplishments of these young people, and their willingness to help others, bodes well for the future, both of amateur radio and the youth of our country."

Kevin Karamanos, WD6DIH, Yaesu USA's Amateur Radio National Sales Manager, agreed. "Yaesu is pleased to see so many fine young people nominated for this award and who have become so deeply involved with amateur radio. This is the primary reason why we support this award program," said Karamanos, adding, "To us, Adam Weyhaupt and the two runners-up are excellent examples of today's American youth, and we join with all of the nation's radio amateurs, young and old, in commending them on their great public service and other achievements at such a young age."

Weyhaupt was presented with his award at the Huntsville, Alabama, Hamfest in August. And what advice does 1995's Young Ham of the Year have for his fellow young hams?

"Jump in with both feet. Get as wet as you can," says N9MEZ. "Don't say 'I can't do it, I'm just too young.' If there's something you don't know how to do, there's always someone who's more than willing to teach you. And you'll quickly become better than many adults. I guarantee it." ■

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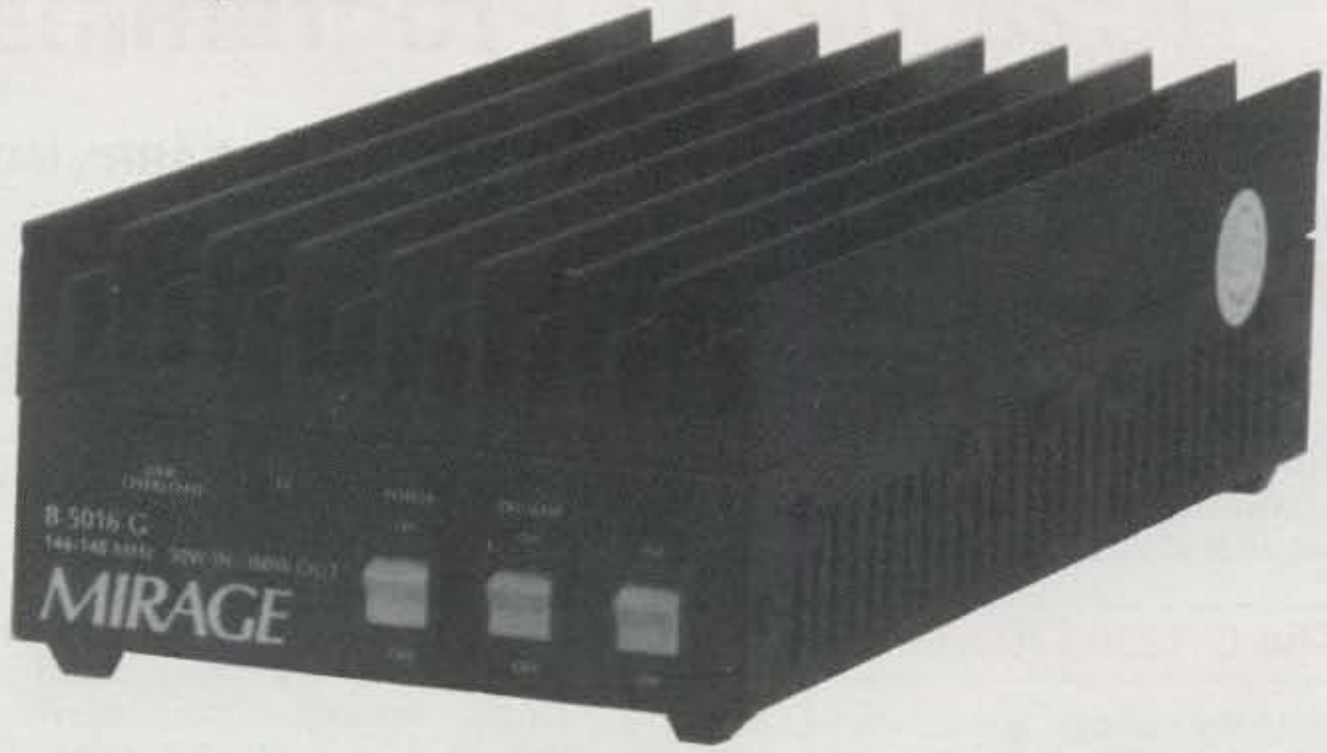

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The B-5016-G is legendary for its ruggedness. *We know of one that has been in constant use since 1979!*

Your B-5016-G is *fully protected* with features found only in expensive commercial amplifiers.

High SWR or excessive input power can damage your amplifier. Protection circuits automatically bypass your amplifier to prevent damage and an LED lights to warn you.

Your expensive power transistors are protected from overheating by MIRAGE's *Therm-O-Guard*™. It automatically shuts down and bypasses your amplifier if needed.

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You can remotely control your B-5016-G and place it out of the way. An RC-1, $45, Remote Control Head, lets you turn Power On/Off, Preamp On/Off and select SSB/FM.

Extra heavy-duty heatsink spans entire length of cabinet. Draws 17 to 22 amps from 13.8 VDC. 12x3x5½ inches.

Power Curve **-- typical B-5016-G output power for your input**

Watts Out	*130*	*135*	*140*	*145*	*150*	*155*	*160*	*165*	*170*
Watts In	*20*	*25*	*30*	*35*	*40*	*45*	*50*	*55*	*60*

More 160 Watt, 2 Meter Amplifiers . . .

B-2516-G, $299. Same as B-5016-G, but for 10 to 35 watt mobile or base stations. Gives you 160 watts out for 25 watts in.

B-1016-G, $379. MIRAGE's most popular *dual purpose* handheld *or* mobile/base 2 Meter amplifier gives you 160 watts out for 10 watts in. For 0.2 to 15 watt transceivers.

B-215-G, $379. MIRAGE's most popular *handheld* 2 Meter amplifier gives you 150 watts out for 2 watts in and 160 watts out for 3.5 watts in. For 0.25 to 5 watt handhelds.

Call your dealer for your best price!

Turn your mobile, base or handheld into 160 watt powerhouses and talk further, longer, clearer . . . Call your dealer today for *your best price!*

6 Meter Amplifiers (50-54 MHz)

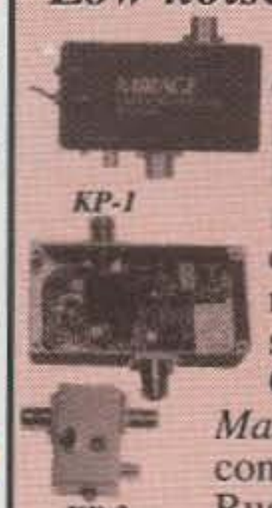
Bust through 6 Meters with 150 watts of brute power and work exotic DX! The **A-1015-G**, $389, is the *world's most popular* all mode FM/SSB/CW 6 Meter amplifier. For 1 to 15 watt transceivers. 150 watts out for 10 in. **A-1035-G**, $659, 350 watts out for 10 in. Both 12x3x5½ inches.

70 cm Amplifiers (420-450 MHz)

MIRAGE's *most popular 70 cm amp* -- the **D-3010N**, $365 -- gives 100 watts out for 30 in. For 5 to 45 watt *mobile/base*.

D-1010-N, $395, 100 watts out for 10 in. *Dual purpose* -- for handhelds *or* mobile/base. **D-26-N**, $269, 60 watts out for 2 in, for *handhelds*.

Low noise GaAsFET Preamps



High gain *ultra low noise* GaAsFET preamps for receiving weak signals. Selectable gain prevents receiver intermod. 15 to 22 dB gain. Less than 0.8 dB noise figure. Automatic RF switching up to 160 watts. **Choose** *In-Shack* model or *Mast-Mount* (includes remote control) model to reduce loss. Rugged die-cast enclosure.

Frequency (MHz)	*In Shack $139*	*Mast Mount $195*
28-30	KP-1/10M	KP-2/10M
50-54	KP-1/6M	KP-2/6M
144-148	KP-1/2M	KP-2/2M
220-225	KP-1/220	KP-2/220
430-450	KP-1/440	KP-2/440

Remote Control Head for Amps

Remote controls most MIRAGE amps. Power On/Off, preamp On/Off, switch for SSB/FM. 18 foot cable (longer available). 1¾x3¾x2½ inches. RC-1, $45.

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CIRCLE 89 ON READER SERVICE CARD

CQ REVIEWS:

The M² OR2800 Antenna Rotor And RC2800P-AZ Programmable Control Unit

BY PAUL CARR*, N4PC

A comment often heard at club meetings is "Boy, I wish I had a bigger antenna!" I guess that's a view held by almost all amateurs. We never think our antenna is large enough. Well, a larger antenna often necessitates the installation of a larger rotor. The M² OR2800 may be just what you've been looking for.

The OR2800 Antenna Rotor

When the package arrives, the first thing you will notice is its weight. Shipping weight is 53 pounds, which indicates that the contents are massive. The unit's net weight is 42 pounds. This is husky enough to handle antennas weighing up to 1800 pounds. That should be enough to satisfy your present and future requirements.

The rotor unit is designed for antennas of up to 35 square feet of wind loading. To ensure proper operation of the unit, the starting torque is rated at 3500 inch pounds, and the rotating torque is rated at 2500 inch pounds. After the antenna is turned to the new position, the braking torque is specified as 17,000 inch pounds. (An inch pound of torque is defined as the application of a one pound force to a lever one inch from the pivot point; it is the mathematical product of the force in pounds multiplied by the lever arm length in inches.)

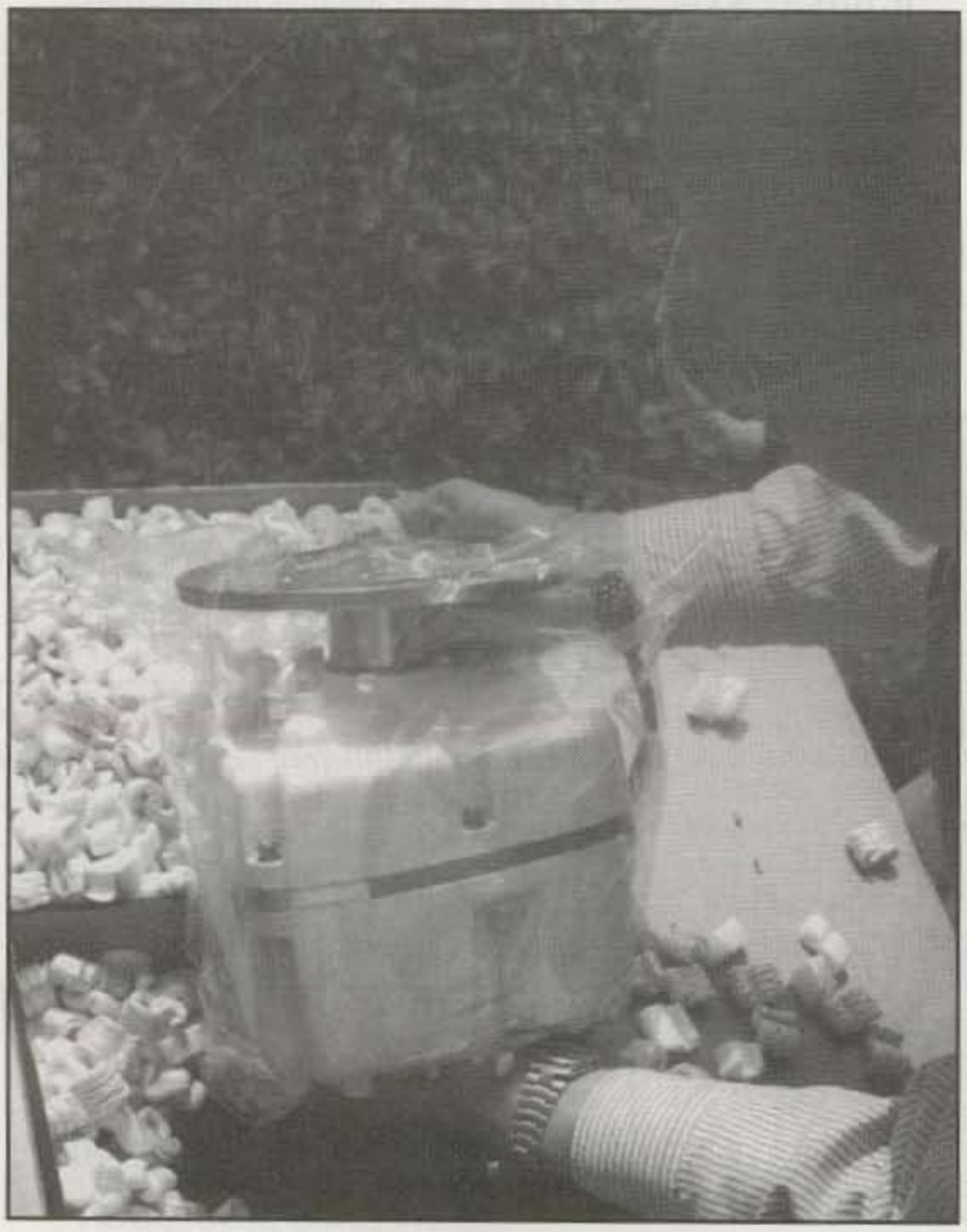
The rotor will accommodate masts up to 3 inches in diameter. There is also a provision for self-centering of the mast. The rotor unit requires a five-conductor control. For runs of 125 feet or less, three #18 and two #22 conductors are required. There is also a provision for an optional Peak Torque Absorber. This device helps to dampen the affects of high rotational torque stress produced by high winds and large arrays.

The RC2800P-AZ Programmable Control

In case you haven't noticed, we live in the digital control age. If you don't believe this, just take a look under the hood of your car! The new control units for rotors also fall into this category. The digital display unit is housed in a small cabinet. There are several push-button switches on the front of the unit. At the lower left is the power switch which controls the input power. Reading from left to right, you find the mode selection, speed, and azimuth display. There are two remaining controls that activate the clockwise or counterclockwise rotation when the controller is in the manual mode.

There are 14 possible modes. Modes 0, 1, and 2 are RUN modes which move the antenna through manual or preset commands. Modes 3 through 9, and 20 through 23 are PROGRAM modes which permit entering, changing, or reviewing program heading presets, travel limits, ramp/speed selection, pulse/360° travel ratios, and other system parameters. Program access can be accomplished by depressing the upper mode button for 3–5 seconds. After the new parameters are entered, depressing the lower mode button for

*97 West Point Road, Jacksonville, AL 36265



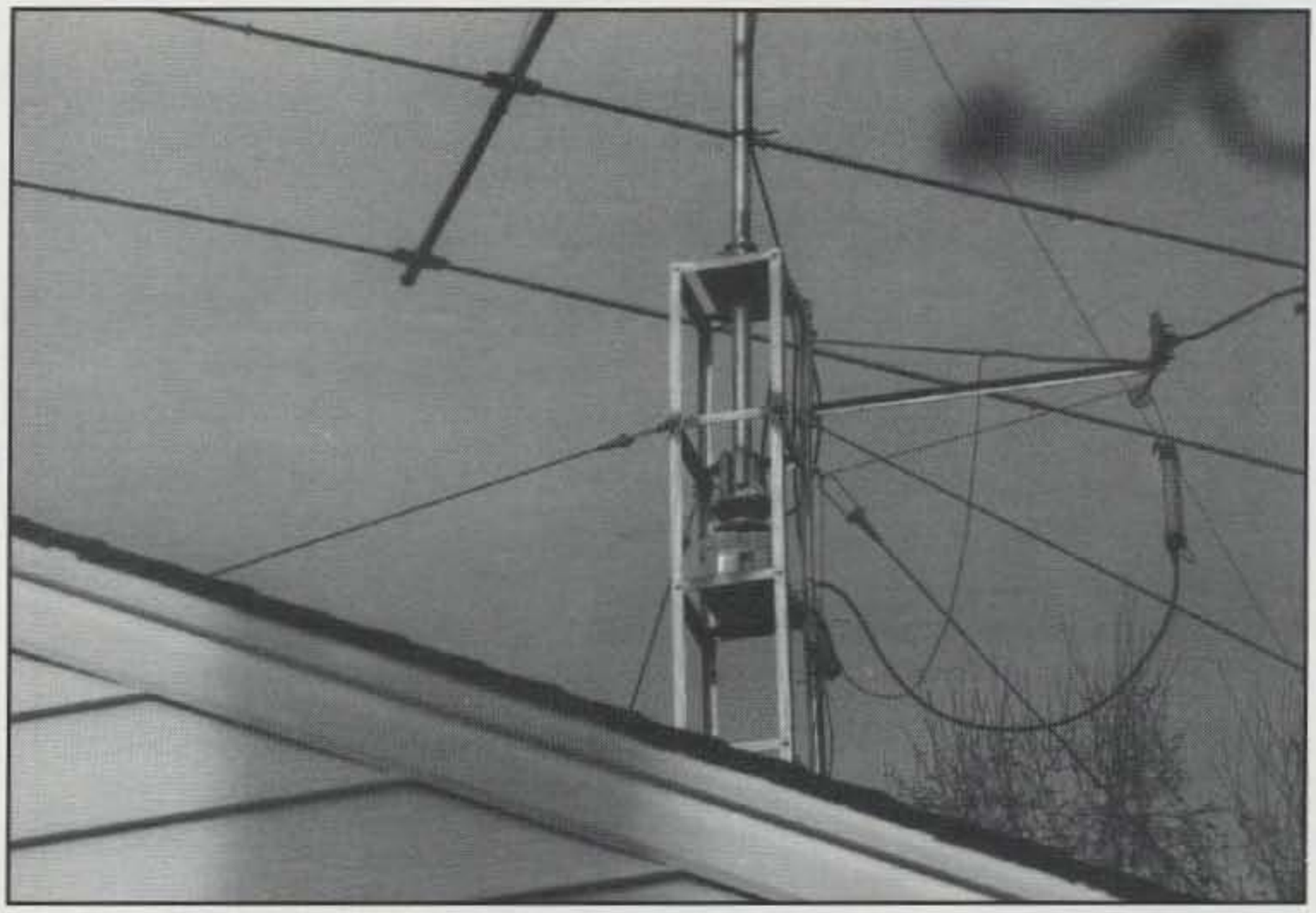
← *Lifting the rotator out of the carton is definitely a two-handed operation due to its weight.*

↓ *Rotor control box on the left is described in the text. Rotator is shown with the Ductile iron mast clamps lying on top prior to assembly.*

OR-2800 SPECIFICATIONS

Wind Area Capacity	35 sq. ft.
Starting Torque	3500 in. lbs.
Rotating Torque	2500 in. lbs.
Braking Torque	17,000 in. lbs.
Vertical Load Capacity	1800 lbs.
Mast Size (O.D.)	1.75–3 in.
Rotation Speed/Range	70-90 sec.
Rotation Range	360° +28°
Readout Resolution	0.1°
Travel Accuracy	±5°
Input Voltage	110/220 VAC
Motor Voltage	28–42 VAC
Cable Req.—Min.	three #18, two #22
Weight (rotator unit)	42 lbs.
Shipping Weight	53 lbs.

Table I– Mechanical and electrical specifications for the OR-2800 rotator.



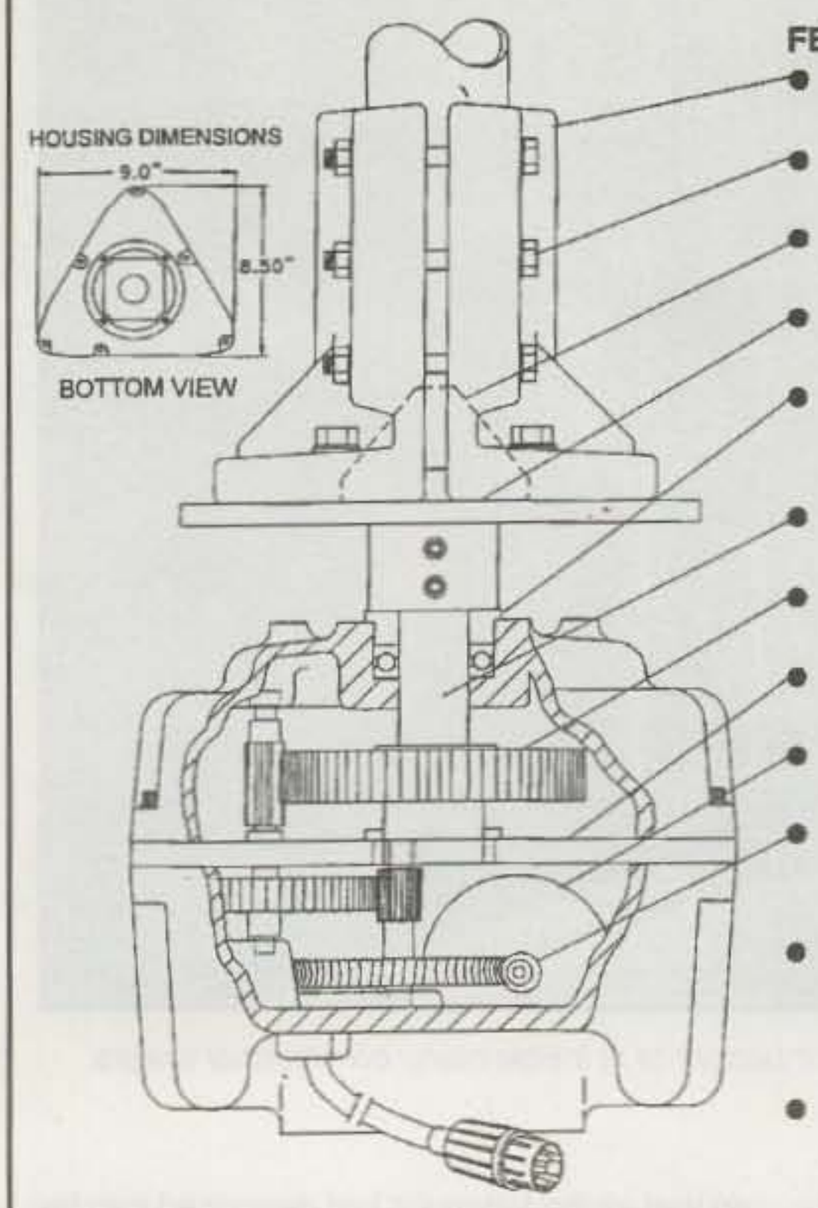
The rotator mounts to a standard 3" x 3" bolt pattern to fit inside many commercial towers.

3–5 seconds will save the new program, and then it defaults to one of the RUN modes.

There are a total of three RUN modes. The manual mode, mode "0," allows you to control the antenna rotation by depressing the CW/CCW buttons. In the preset mode, mode "1," the desired heading is selected by using the CW/CCW buttons. The rotor begins to turn after the button is released. The last RUN mode, mode "2," controls the preprogrammed presets. There are a total of four preset headings available. These presets can be selected by the CW/CCW buttons. Most of the remaining modes are used for selecting system parameters. There are four modes reserved for storing the programmed preset headings. There is a "blank display mode" which is used to exit the Program modes without change. There are also nine rotational speeds available. On the back of the controller cabinet is an RS-232 port so that all the functions just described can be controlled from a suitable computer.

Unit Installation

The ease of installation of this or any other con-



FEATURES:

- **NEW** sure-grip Ductile iron mast clamps
- **NEW** Grade 5, 3/8-24 steel hardware
- Self-centering mast guide
- **NEW** Larger drive plate: masts up to 3"
- Large thrust bearing for hi loads/low friction
- **NEW** Extended and hardened driveshaft
- **NEW** heat-treated steel gear train
- **NEW** Prop-pitch style torque plate
- Powerful motor with high starting torque
- Precision worm-drive, cannot be reversed by mast torque.
- Mates to standard 3" x 3" bolt pattern, fits inside towers like Rohn 25 (top only) & 45, Triex LM-354, U.S.Towers TX438.
- Magnetic pulse counter for accurate control and digital display

Fig. 1– Cutaway mechanical view of the rotator assembly.

struction project is largely dependent on the amount of planning. The base of the rotor is designed to mount on a flat plate using a 3 inch square pattern drilled to clear 5/16 inch bolts. Most standard mounting plates supplied by tower manufacturers are drilled on the 3 inch pattern, but the hole size may need to be enlarged to 5/16 inch. Be sure to check your base plate for proper dimensions.

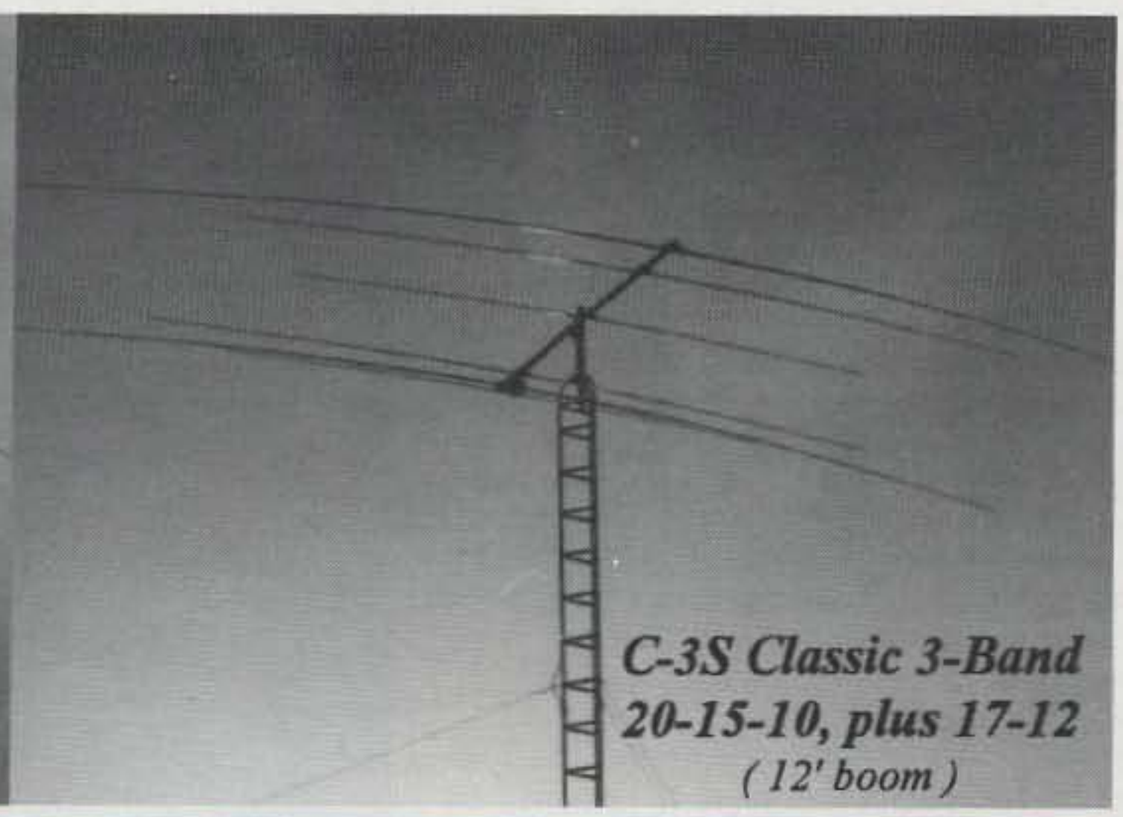
For best results and minimum trips up the tower, test and calibrate the system on the ground before installation. This will let you become familiar with the components and controls, and it will allow verification of proper wiring prior to final placement. Upon completion, turn the rotor unit to the heading of a known landmark or compass heading. After the rotor is installed, simply turn the antenna to the direction of the landmark, tighten all hardware, and the installation is complete.

As with any project of this type, safety should be foremost in your mind. Be sure that the rotor unit, control cable, antenna, and you do not come in contact with any electrical wires during installation or operation. This is also a good time to verify the tower is properly grounded. Do not skip this step, as you may not get a second chance!

These units are manufactured by M² Antennas, 7560 North Del Mar, Fresno, CA, 93711 (209-432-8873). The list price for the units described is $1329. These units have a twelve-month limited warranty when purchased from M² or their authorized distributors. ■

In response for a smaller model of the fantastic *C-3*, we put it on a little diet: the *C-3S*.

C-3 Classic 3-Band
20-15-10, plus 17-12
(18' boom)



C-3S Classic 3-Band
20-15-10, plus 17-12
(12' boom)

C-3S NUTRITIONAL INFORMATION PER SERVING

Serving Size (Mtrs)	20-15-10 primary + 17 & 12	Elements (all full size)	6
Net Wt.	26 Pounds (12 kg)	Length of Boom	12'
Power Handling	5KW	Wind Load (sq.ft.)	4.9
Fat	0	Wind Rating (min.)	>80 mph
Average Gain (20-15-10)	4.5dBd	Average F/B (20-15-10)	>14dB
Number of Traps per Antenna	0	Efficiency	>98%
Number of Phasing Lines	0	Average Time for Assembly	1 hour
Pre-aligned elements (on boom)?	YES	Riveted Construction?	YES
Easy-On™ Mount?	YES	Optional Bands per Antenna	40 Mtrs
Standard Packaging	4' box	1:1 Balun or RF Choke Required?	YES

Percentage of Minimum Daily Radio Enjoyment 100%

The unbeatable ***C-3*** performance has been extended to a smaller footprint. The ***C-3S*** incorporates a re-designed 10 mtr section allowing the boom to be only 12'. The trade-off is the ***C-3S*** covers about 1.1 MHz (i.e. 28.200-29.300) with a 2:1 VSWR, where the ***C-3*** covers the entire 10 mtr band. The gain of the ***C-3S*** is within .1 to .2dB of the ***C-3***. The ***C-3S*** can also cover 40 Mtrs, with 130 kHz 2:1 VSWR. This is the ***C-4S***. The ***C-4C*** conversion can be utilized later to make the ***C-3S*** into a ***C-4S*** in the field.

Force 12 has the finest line-up of antennas to cover the classic 20-15-10 bands with a single feedline. The antennas also feature gain on 17 and 12 mtrs, with a VSWR of about 2.8:1, easily matched with any tuner. All are trapless and are acclaimed as outperforming all the various trapped antennas. Included in the line-up is the C-3XL, a composite of larger monobanders.

The complete series of antennas for the classic 3 bands (plus 40 mtrs) is the following:

C-3S 20-10 mtrs, 12' boom ***C-4S*** 40-10, 12' boom ***C-4SXL*** 40-10, 23' boom (includes 2 el on 40)
C-3 20-10 mtrs, 18' boom ***C-4*** 40-10, 18' boom ***C-4XL*** 40-10, 30' boom (includes 2 el on 40)
C-3XL 20-15-10, 32' boom, which has a 3 el 20, 3 el 15 and 4 el 10, all with separate feedlines for maximum versatility.

Force 12 has more than 60 antennas from 160-6 mtrs. They include rotatable dipoles for 160, 80/75, 40, 30; 2 and 3 element yagis for 80, 40 and 30. Several combinations of 40/20, 40/30/20 and 40/30 yagis; the ***MAGNUM 2 / 2*** which has 2 el on 80 and 2 el on 40. Multibanders for 20-17-15-12-10, 20-17-15, 17-15-12-10, 15-10, 17-12; all without traps or phasing systems. There are also magnetic transmitting and receiving loops (***MTR***'s) for 80, 40 and 40-20 made from 2" tubing. They provide an excellent antenna for confined or restricted locations. ***MTR***'s are perfect for regional coverage with NVIS propagation. There is more.

The C-3S is available at all 12 HAM RADIO OUTLET stores and TEXAS TOWERS. List is $429. Buy now & have fun!

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Radio FUNdamentals

BY BILL ORR, W6SAI

THINGS TO LEARN, PROJECTS TO BUILD, AND GEAR TO USE

The Collins 30L-1 Amplifier Revisited

In the early 1960s Collins Radio Company introduced the model 30L-1 linear amplifier for amateur HF use. This was a unique design. It boxed a 1 kilowatt PEP amplifier and power supply in the same size cabinet as the popular KWM-2 transceiver. In fact, it was designed as a companion unit to the transceiver.

Production of the 30L-1 ceased some years ago, but the amplifier has remained a favorite on the second-hand market. The few units offered for sale are snapped up at a good price by eager amateur radio operators anxious to have a well-designed, compact amplifier that will work with today's modern transceivers.

Recently, a large contingent of 30L-1 amplifiers hit the market. These were released by the military, who used them in the Desert Storm operation, and also by NATO, who fitted the amplifiers into a transportable communication system.

In general, the newly surplus amplifiers are in good shape, aside from some bangs and dents in the fragile aluminum case. The units were snapped up, some by hams, and others by dealers who resold them to the fellows who were not johnny-on-the-spot when the amplifiers hit the market.

Since the exact use of the amplifiers is unknown (as far as frequency is concerned), and the amount of maintenance questionable, I'm offering some maintenance and adjustments you might consider before your amplifier is put on the air. The following material was gained by putting one of the surplus units on the air myself.

The Collins 30L-1 linear amplifier introduced in the early 1960s.

The 30L-1 Amplifier Circuitry

The 30L-1 amplifier uses four 811A high-mu triodes in parallel in a grounded grid circuit. The amplifier covers the range of 3.4 to 30 MHz in five bands. It is theoretically possible to operate at any frequency in that range, provided the cathode input circuits are tuned to the operating frequency.

The amplifier power supply is normally connected for 115 volt operation, but the primary connections may be changed for 230 volt operation. Under normal operation, standby plate voltage is 1800, dropping to about 1600 volts under full output.

An antenna changeover/VOX relay is incorporated in the 30L-1 so that it may be controlled from the transceiver. An ALC control circuit is also provided.

Under key-down operation (not recommended) the amplifier draws 600 ma plate current at about 1600 volts anode potential. This equates to a plate input of 960 watts. Some of the drive power is fed through the amplifier, so it actually reaches an input of 1 kW PEP.

The user of a 30L-1 is cautioned that it does not have the overload capability of many modern amplifiers. Because of the size and compact design, there is very litle margin for tune-up error or overload in either the power supply or the 811A tubes. Don't be greedy and push this amplifier for the last available watt, as it does not have the reserve.

48 Campbell Lane, Menlo Park, CA 94025

Preliminary Checks On The Amplifier

Before you turn on the amplifier, there are some checks you should run to ensure proper operation. First, you should check to see if the amplifier is wired for 115 or 230 volt operation. This can be done with an ohmmeter. Measure the resistance between the two blade pins on the power cord. If the amplifier is strapped for 230 volt operation, the resistance will be about 2.2 ohms. The resistance will be about 1 ohm for 115 volt operation.

Next you should remove the 811A tubes and eyeball them. If the glass envelope of a tube is gray instead of clear, it means the tube has many hours of use and its operation is questionable. If there are burned, bright spots on the plate, it indicates the tube has been overloaded. It is prudent to replace such a tube. More on tube selection later.

Once you have removed all tubes, use your ohmmeter to measure the resistance from one filament pin socket (one of the large ones) to ground. It should be near-zero ohms. You are checking out a fuse in the filament return circuit (not shown on the schematic, but mentioned in Section 4.1 of the manual). This fuse is a short length of No. 30 wire in the ground return of the filament winding of the power transformer. It will blow and protect the 811As from excessive current. It is rated at 700 ma steady current and will blow at about 1000 ma. Whether this protects the tubes is questionable. If the four 811As draw 1000 ma even for short period, at least one or more will be ruined. In any event, if the fuse is blown, the amplifer won't play! The fuse wire is mounted between two outer lugs of a terminal strip located near resistor R11 in the power supply compartment.

You now know the protective fuse is okay and the line voltage for which the amplifier is wired. The next step is to check the 811A tubes. Eyeball them. Look for little pieces of wire bouncing around inside the tube as you rotate it. If such wires are visible, it means that a section of the filament or grid is broken and the tube is useless. Clean the glass of the tube with a damp rag and clean the base pins. I scraped the pins with the blade of a small knife to remove corrosion.

If you can lay your hands on a tube tester, check the tube. I used a surplus TV-7 transconductance checker for my tubes. They all should give approximately the same reading on the checker.

Finally, check the line fuses and lubricate the blower motor bearings with a few drops of machine oil.

Primary Power For The 30L-1

The amplifier operates from a 115/230 volt, 60 Hz power line. For best regulation, it should be run on a 230 volt circuit.

Over the years, since the 30L-1 was designed, the utility companies in the U.S. have gradually been boosting line voltage to accommodate increased loads on existing circuits. In my home, for example, I measure 122/244 volts most of the day. This results in overage of 7 volts on the 115 volt amplifier primary circuit, or 14 volts on the 230 volt circuit.

No big deal, you might say. However, the situation is otherwise. The 30L-1 is designed with little tolerance for tuning error. In addition, the power transformer, filter capacitors, and 811A tubes are working at their maximum intermittent rating at the designated voltages. Running the amplifier at my line potential subjects the amplifier components to a 7 percent

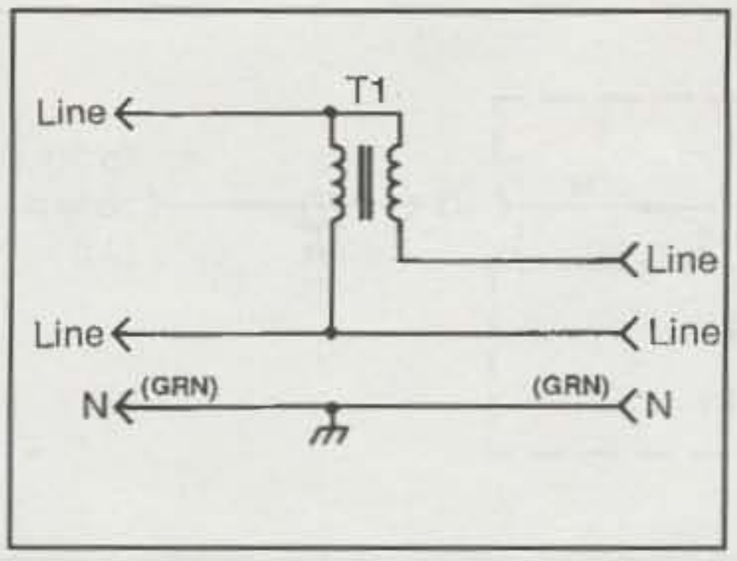

Fig. 1– Primary autoformer is a filament transformer wired so as to buck the line voltage down to the proper value. Secondary of the transformer is in series with one side of the line.

overload. This exceeds the voltage tolerance limits on the tube filaments and capacitors, besides making the power transformer run very hot. The amplifier runs hot enough as it is, so stressing it further is a risky operation. I don't recommend it.

A Primary Autoformer

It is a good idea to reduce line voltage to the 115/230 volt rating. This can be accomplished with an autoformer. A filament transformer can be used, provided the secondary can pass the line current. This transformer is connected so as to buck the line voltage (fig. 1). In my case, I used a 7.5 volt, 10 amp transformer. This reduced my line voltage to about 114.5.

The primary of the transformer is connected across the line, and the secondary is in series with the line. If the secondary connections are incorrect, the line voltage will be boosted by 7.5 volts. You have a 50-50 chance of hitting it right the first time.

If you are wired for 230 volt operation, and your line voltage is 244 as mine is, a 10 volt, 5 amp transformer will buck the voltage down to 234 volts. Close enough. For 230 volt service, you'll need a transformer with a 220 volt primary. That may be a sticky wicket. Check the surplus outfits.

Amplifier VOX Circuitry

The 30L-1 has an internal relay that controls antenna changeover and standby circuitry. That relay can be activated by the "Remote" or "VOX" circuit of the transceiver. The relay in the 30L-1 obtains its voltage from the –170 volt bias supply. The relay coil draws about 85 ma current.

It may be risky to key this relay directly from the transceiver. Some makes of transceivers use a power transistor to actuate the amplifier's changeover relay, while others use a small mechanical relay the contacts of which are not rated for the voltage and current required by the 30L-1 circuit.

It is best, therefore, to make up an intermediate relay that can be safely driven by the transceiver, regardless of whether that unit uses a transistor or a relay as a VOX driver. A suitable circuit is shown in fig. 2. A small relay with a 9 volt, 18 ma coil (Radio Shack 275-005) is activated by the transceiver circuit, and this secondary relay activates the VOX circuit in the 30L-1. The relay and a 9 volt battery are placed in a small aluminum box (Radio Shack 270-235) measuring 2¾" × 2⅛" × 1⅝". A phono input plug and an output cable complete the simple installation, which may be held to the rear case of the amplifier by stickum tape. Now there is no danger of damaging the receiver circuitry by the relatively high voltage and current drawn by the amplifier relay.

The 811A High-mu Power Triode

The 811 triode was brought to the market in the late 1930s. It was designed mainly for class B audio service. The tube suffered from low plate dissipation rating, and a few years later RCA (the designer of the tube) brought out the 811A, which was the same tube, but with small cooling fins added to the anode to boost the plate dissipation rating a bit.

The 811A has a maximum dissipation rating of 65 watts. At this level the anode will just show a dull red color when observed in a dark room. Four 811As, of course, have four times this dissipation rating, or 260 watts when they are properly ventilated.

Problems With The 811A Tube

The early 811A tubes with the old RCA logo on the base were beautiful examples of tube design and manufacturing. However, during the last, sad days of RCA when the transistor was shooting the vacuum tube out of the sad-

dle, RCA succumbed to the lure of letting the cost accountants, rather than the tube engineers, dictate the manufacturing processes—or so it seems. Late productions of the 811A were unhappy knock-offs of the early design. Ceramic plate supports on the vertical anode rods were removed, the mica support at the top of the tube anode disappeared, and the plate lead from the anode strap to the top cap was butt-welded to a thin wire, instead of being welded to a sturdy strap.

The "improved" 811A seems to work about as well as the older configuration, but the internal structure is fragile and subject to vibration damage.

In any event, the 811A works to its maximum capacity in the 30L-1, so every attempt should be made to get good tubes. My experience has been that some of the 811As in the surplus amplifiers have been cooked at one time or another, so this is a major problem for the owner of one of these.

A New Version of The 811A

Some years ago power tube engineers had the opportunity to examine some transmitting tubes brought back from the USSR by an amateur who visited that country. Visually, the tubes seemed excellent, and first-class assembly techniques were obvious. The tubes were tested and the results were mixed. The pumping and aging techniques used in the USSR at that time were not up to the attractive mechanical quality of the tubes.

Recently, the tube engineers had the opportunity to examine and test transmitting tubes made in the new Russia and also the People's Republic of China. It was immediately obvious that the Russians had made great strides in quality control, and that the Chinese tubes were in the questionable category occupied by the tubes of the defunct USSR. Over a dozen factories in China make transmitting tubes. Some are good; some are not. And the unfortunate purchaser doesn't know from

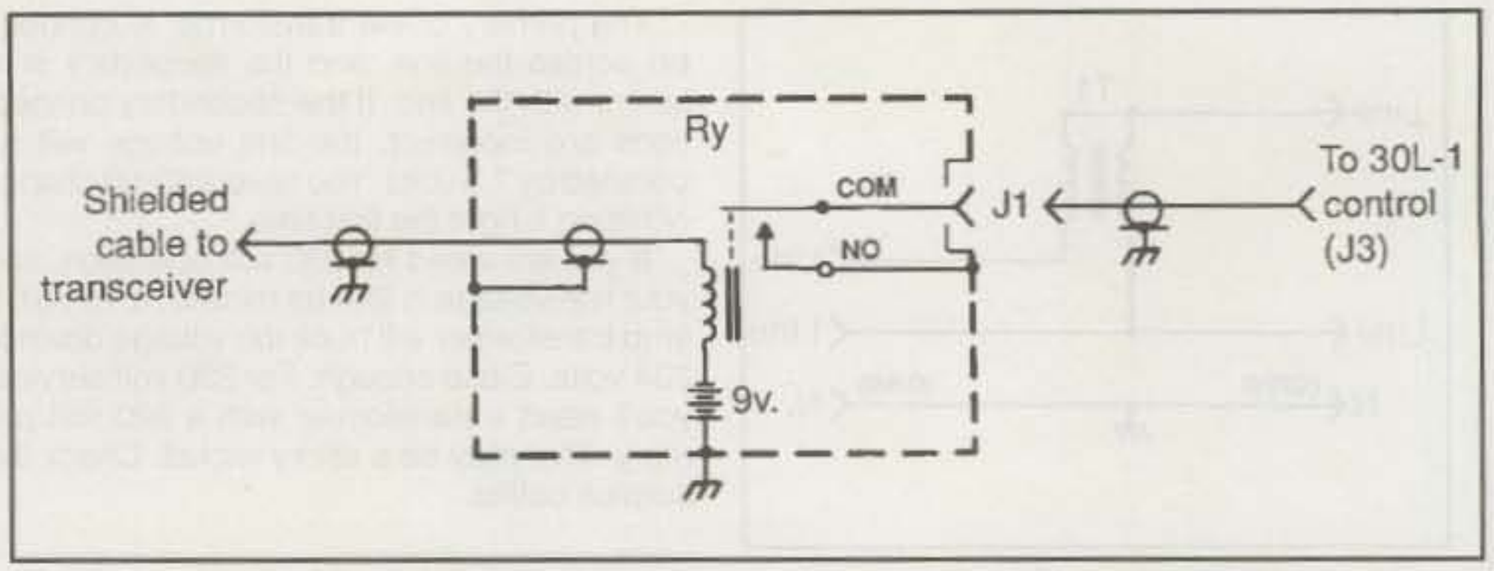

Fig. 2– Intermediate control relay circuit. (Ry = Radio Shack 275-005 relay.)

which factory his tubes came! The 6146 is a good example. Some Chinese 6146s are so out- of-spec that they didn't fit into the amplifier enclosure of a TS-830. They are too tall. Others are gassy, or have poor gain.

In the last few years, assisted by American expertise, the Russians are turning out first-class tubes, including 811As. The Russian 811A looks like the good old RCA job, but with the addition of a ceramic base, and a ceramic insulator under the plate cap to protect the glass envelope from electrolysis. In addition, a hard glass envelope is used, specifically intended for transmitting tubes, instead of the soft glass envelope of the RCA 811A.

Four Svetlana 811As (from Svetlana Electron Devices, 3000 Alpine Road, Portola Valley, CA 94028; phone 415-233-0429) are running in my 30L-1 amplifier. Operation is uneventful, the results equalling those achieved with the early RCA tubes. The four tubes seem evenly matched, as all run at approximately the same temperature.

A Word of Warning

Regardless of the brand of 811A you use, you might find that you can get the tubes into the amplifier sockets, but you can't get them out! The bayonet pin on the tube base snags against the aluminum chassis. Most embarassing. I eliminated this annoying problem by filing off the pin before I put the tube in the amplifier.

Amplifier Input Circuits

Individual pi-network circuits are used for each frequency range of the 30L-1. They are changed by the main bandswitch. Since the surplus amplifiers arriving on the market probably were used on frequencies outside the amateur bands, it is a good assumption that these circuits were retuned to an out-of-band frequency at some time. I checked the input circuits in my amplifier and found they were tuned to 3.8, 8.6, 16.6, 24.1, and 30.1 MHz. The Collins manual provides tuning information for these circuits. Operation with the input circuits mistuned results in unusual plate circuit tuning and, in extreme circumstances, amplifier oscillation.

A Heartfelt "Thank You!"

I really appreciate the friendly letters I have received urging me to continue this column. Thank you all. I'll do the best I can, perhaps on a bimontly basis. We shall see. To the following, my 73 and gratitude: Mel Schaefer, WB2KFN; Thomas Hart, AD1B; Martin Wincott, K2BRY; Andrew Pfeiffer, K1LKO; Paul Scholtz, W6PYK; Anthony Musero, K3UKW; Brian Beezley, K6STI; Robert Lorenz, AB6MA; Rod Newkirk, W9BRD; Ed Gilner, W6ZZN; Ronald Renaud, W8FEU; Richard Harmon, KK5BR; Irving Morris, W2GMT; Jack Bennett, W8NEN; Jack O'Brien, W2YYI; Fred Linn, W9NZF; George Papalias, W6GBA; Bill Hadguis, N5FIH; Robert Boehmig, W4SJS; Rod Hotz, K5BGB; Brad Williams, KE7IP; Phil DeJarlais, WØJHS; Wayne Rhine, ex-DL4AC; Bill Byron, W7DHD; Harold Ort, N2RLL; Paul Vaughn, WA4FST; John Clark, WF3Y; Doug DeMaw, W1FB; Harry Johnson, NV7K; Willard Waite, W8GDO; George Purcell, WA3IND; Phil Sonderman, WA6IPT; Oscar Clinton, N5ZIH; John Monroe, W7KCN; Rex Pealer, KB8HZH; Al Bry, W2MEL; Byron Weaver, WU2J; Ray Gregson, W6EMT; Steve McDonald, VE7SL; John Chapman, WA1KYH; Bill Ryder, W1KL; Jerry Sevick, W2FMI; Bob Wheaton, W5XW; Vince Bashore, ex-W2IDN; Charles Kitchin, N1TEV; Art Roshon, N7ABH; Wayne Cooper, AG4R; Gary Breed, K9AY; Greg Sparacino, N6PUG; Frank Witt, AI1H; and Dennis Bernier, WA1WIA.

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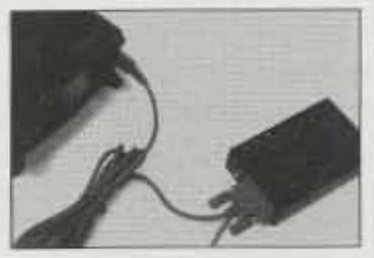

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DOUG'S DESK

BY DOUG DeMAW, W1FB

CONSTRUCTION PROJECTS, TECHNIQUES, AND THEORY

Curing Amateur Radio Station RFI

The radio-interference demon is viewed most commonly as the villain that attacks our neighbor's HI-FI system, his telephone, or his TV receiver. Indeed, that is a challenge that confronts many HF-band operators, and it can spoil VHF operating as well. But what of the reverse effect when unwanted RF currents stay in the shack and disrupt the operation of your own equipment? Does this malady wear a familiar face? It's likely that you have had your share of howling audio, malfunctioning keyers, and RF voltage tingles from touching your station gear. This happens when RF current backs up because it can't find a low-impedance path to ground. This article describes a number of corrective steps that are within the technical ability of any licensed amateur, regardless of his or her technical aptitude.

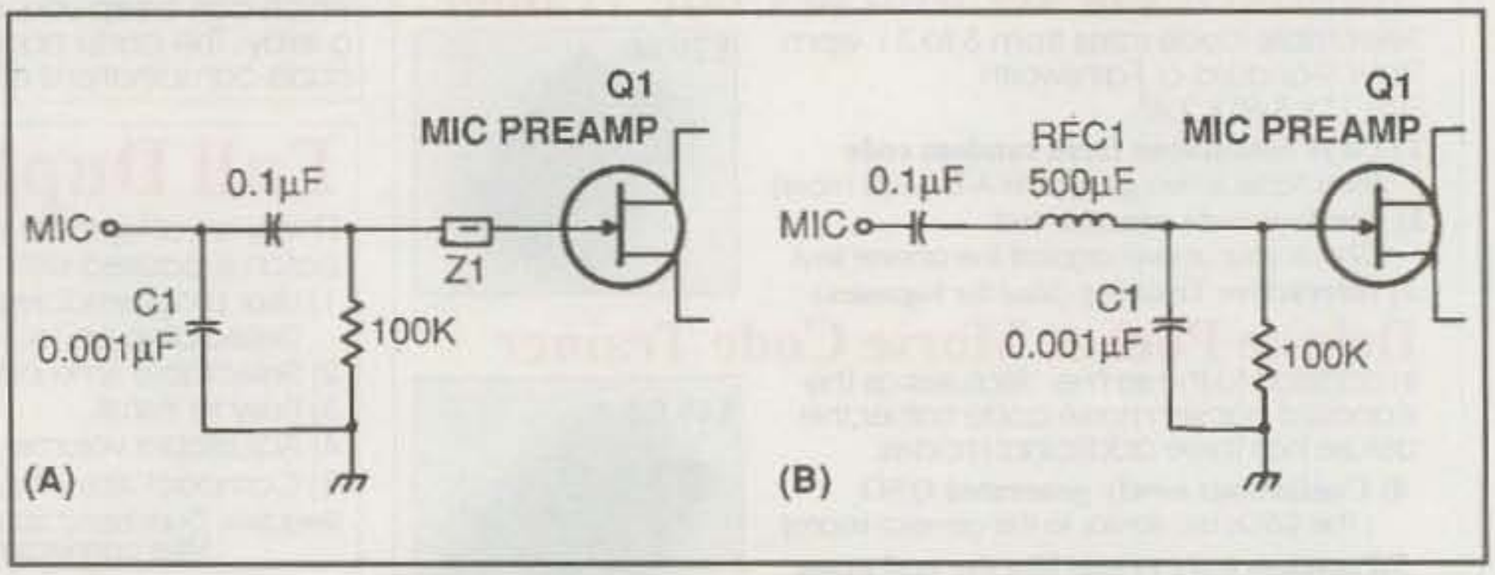

Fig. 1– C1, RFC1, and Z1 may be added to the preamp in an amplified mic to help prevent the effects of stray RF energy. RFC1 may be any value from 220 to 500 µH. Z1 is a No. 43 mix miniature ferrite bead for VHF and UHF suppression.

The Importance of An Earth Ground

The primary step toward ensuring trouble-free operation is to develop a quality earth ground system for the station. This aspect of setting up a station is too often regarded with casual concern. For example, a 30 foot piece of wire connected to a water pipe simply doesn't do the job, especially at 7 MHz and higher. This is because the wire becomes an appreciable portion of a wavelength. The long ground wire is inductive and impedes the flow of RF current to ground. This unwanted RF energy stays in the shack and flows into the equipment. It may also be present on the chassis of the station gear.

A proper earth ground consists of at least four 8 foot ground rods driven into the soil near the radio room. The rods should be spaced 4 feet apart and bonded together (using solder) with a heavy conductor, such as the shield braid from RG-8 coaxial cable, or 1 inch wide straps of copper flashing. The conductor that connects the ground rods to the station equipment must be as short as practicable. It needs to be made from a heavy conductor, such as copper flashing. The greater the surface area of the connecting lead, the lower the stray or parasitic inductance, and hence the less restricted the RF path to ground. The metal cold-water-pipe system in the house can also be tied to this ground bus—likewise for chain-link fencing in the yard.

Careful attention needs to be paid to the ground connections within the shack as well. A wide copper strap across the back of the operating desk or table provides a convenient bus for grounding each piece of station equipment. RG-8 shield braid (keep each lead short) is suitable for the various short leads to the main ground bus on the desk. It is sometimes helpful to ground the transceiver to the linear amplifier by means of a short copper strap, rather than depending upon the shield braid of the coax that connects the transceiver to the amplifier input port.

Amateurs who have their radio stations on the second or higher floors of their homes generally have difficulty obtaining an effective earth ground. In situations of this type it may be necessary to tune the ground lead for minimum reactance. This can be accomplished by using the equivalent of an antenna tuner between the combined station gear and ground wire. Readjustment is necessary whenever major changes in operating frequency take place. An RF voltmeter (1N914 diode and a microammeter) connected to the ground lead serves as a tuning indicator for the network. The C and L values are adjusted for minimum RF voltage at the station end of the ground lead.

P.O. Box 250, Luther, MI 49656

Amplified-Microphone Feedback

A number of modern solid-state transceivers are designed for use with amplified desk mics. It is unfortunate that some designers shave costs by not including RFI suppression in the circuit. Unprotected desk mics of this type are prone to cause distorted audio at RF output power levels above, say, 50 watts. The mere act of touching the mic with your fingers while transmitting will often set up feedback conditions that produce howls and squeals in the transmitted audio.

The cure for microphone feedback is simple and inexpensive. The required preventive measures were described in a *QST* amplified-mic design article.[1] RFI prevention requires the addition of some disc ceramic capacitors and a miniature RF choke.

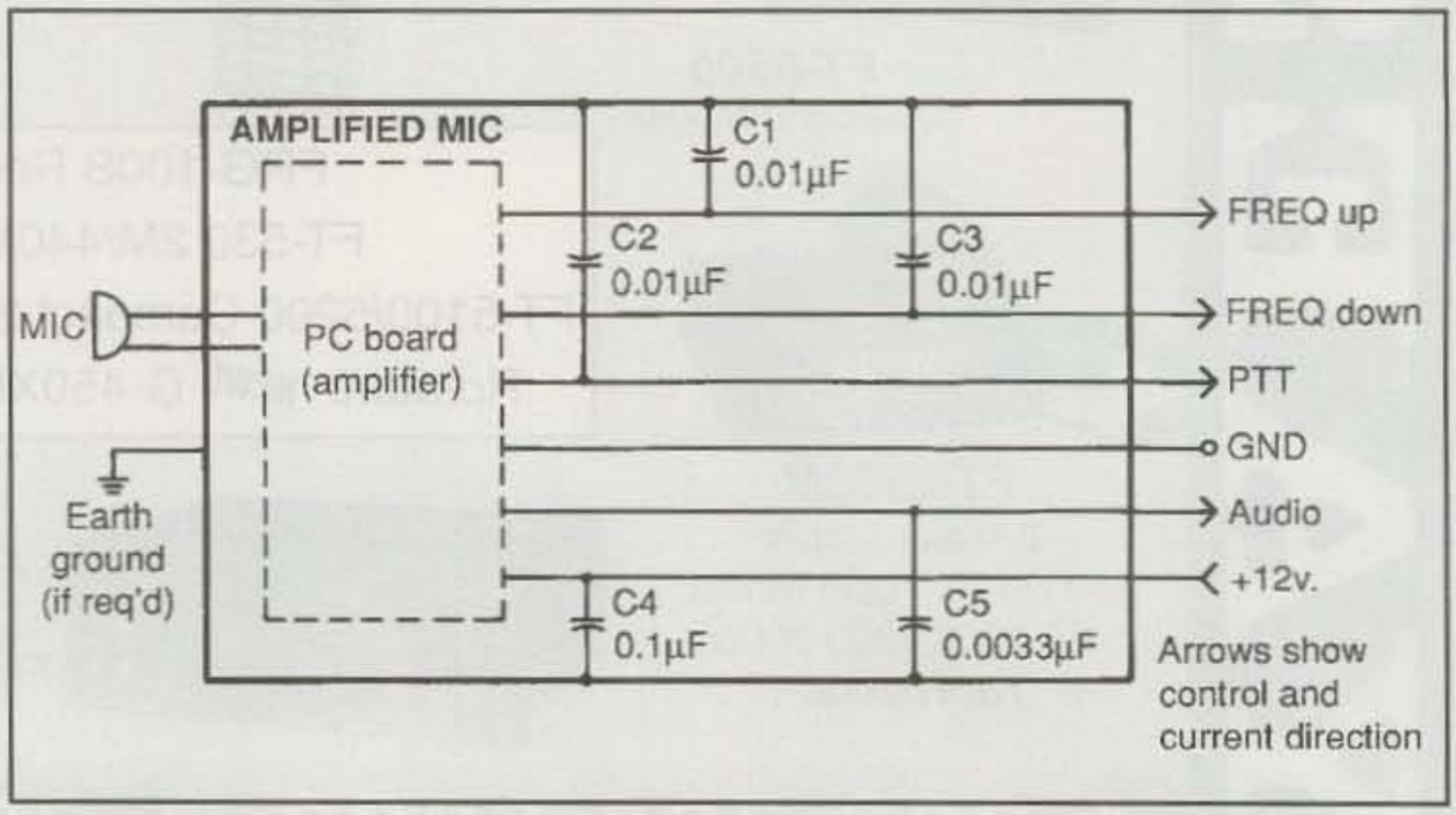

Fig. 2– Block diagram of a typical amplified mic. C1 through C5 are added inside the mic case to prevent RFI effects.

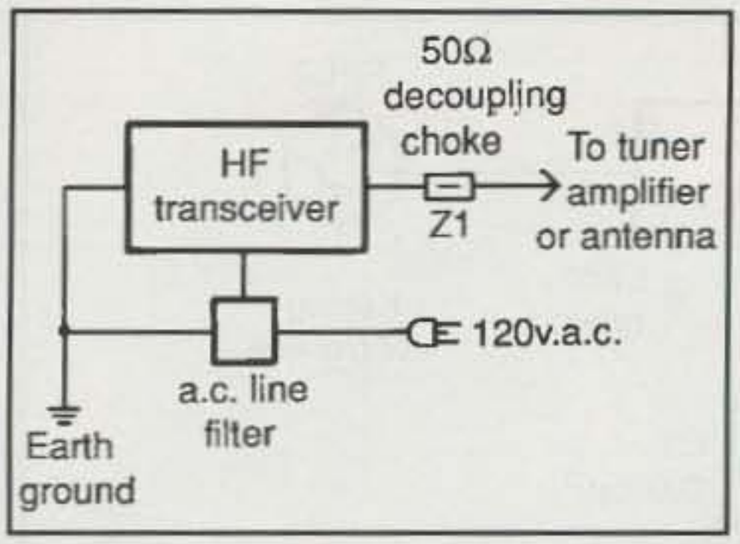

Fig. 3– Method for isolating a transceiver from unwanted RF currents. Z1 is a 50 ohm isolation choke (see text). An AC line filter offers additional protection from stray RF currents.

Fig. 1 shows typical mic preamplifier stages for amplified electret mics. Although Q1 is shown as a JFET, some mics use a bipolar transistor rather than a FET. The cure is the same in either case. The circuit at A shows the addition of Z1, which is a miniature ferrite bead. It should be placed as close to the transistor as practicable. This suppression measure is effective for VHF and UHF operation. It is not sufficient for HF operation. C1 is added to further discourage RFI.

Fig. 1(B) illustrates how to suppress RFI at HF. A miniature 500 µH RF choke is added at the Q1 input terminal (base or gate). Again, C1 is added to bypass RF energy to ground. C1 values larger than 0.0033 µF may impair the high-frequency response of the microphone preamplifier, depending upon the impedance of the mic. Use caution.

Fig. 2 shows a block diagram of a generic amplified mic. Most of these mics have metal frames that are common to the amplifier circuit ground. Therefore, the added bypass capacitors (C1 through C5) may be grounded to the case of the mic unit.

Bypassing the mic output leads helps prevent stray RF energy on the mic cable from entering the sensitive circuits within the transceiver. In a like manner, stray RF currents cannot enter the amplified mic via the mic cable. The mic preamp should be treated for RFI as shown in fig. 1.

The corrective measures seen in fig. 2 should cure mic RFI completely. If a problem remains, try adding an earth-ground connection to the frame of the mic assembly.

Additional Transceiver Protection

Unwanted RF currents may enter the transceiver via the 50 ohm coaxial line that feeds a linear amplifier, antenna tuner, or the antenna. This usually occurs when there is an inferior earth ground system, and if an end-fed wire is used as the antenna. High SWR can cause the same malady. Z1 in fig. 3 may be added to isolate the transceiver from the rest of the transmitting equipment, or the antenna. This 50 ohm choke prevents RF current from flowing along the coax outer conductor to the chassis of the transceiver. Z1 does not affect the system otherwise. A homemade choke can be fashioned by winding a 0.5" × 7½" ferrite rod with RG-58 coax. The permeability of the rod should be 125. The coax cable is close-wound on the core. Radio Works, Inc.[2] sells a commercially

made choke that serves this purpose. The part number is 4K-L1.

Further RFI protection for the transceiver can be ensured by using a brute-force type of AC line filter (see *The ARRL Handbook*), as shown in fig. 3. It prevents RF currents from entering the transceiver along the power cord.

Suppressing Keyer RFI

RF energy that enters a keyer or keyboard generally causes the output data to sound like gibberish. In severe situations the RF currents can lock up a keyer and make it inoperative.

The simple addition of two RF chokes normally will resolve the keyer RFI problem (see fig. 4). A large ferrite toroid, such as an Amidon Assoc.[3] FT-240-43, may be used as shown. Wrap as many AC line-cord turns as possible through the toroid core—likewise for the output cable that goes to the key jack of the transceiver. RFC1 and RFC2 should be located as close to the keyer cabinet as practicable.

Additional protection can be provided by adding C1 and C2 of fig. 4 to the key paddle leads, just inside the keyer or keyboard case. The final preventive step is to attach an earth ground to the keyer enclosure, as shown.

Closing Comments

Perhaps the worst possible environment for RFI problems in station equipment is that of a second- or third-floor station that uses an end-fed random-length or resonant wire antenna. Depending upon the length of the antenna, the station end will exhibit a voltage or current node. The voltage-fed wire (half wave or even multiples thereof) is the worst of the lot, because high RF voltage is present at the tuner, inside the shack. If the operator must use an end-fed wire antenna, he or she should try to use a 1/4-wave radiator, or an odd multiple (e.g., 1/4 wave) thereof. The negative side of this approach is that a ground screen or radials are required in order to ensure good system efficiency. However, acceptable performance is sometimes possible by using the water pipes and chain-link fencing as an alternative ground system. This will result in current feed to the wire, thereby minimizing the effects of having one end of the radiator in the shack. RFI can be minimized by using coaxial cable feed to an antenna that is erected a reasonable distance from the dwelling.

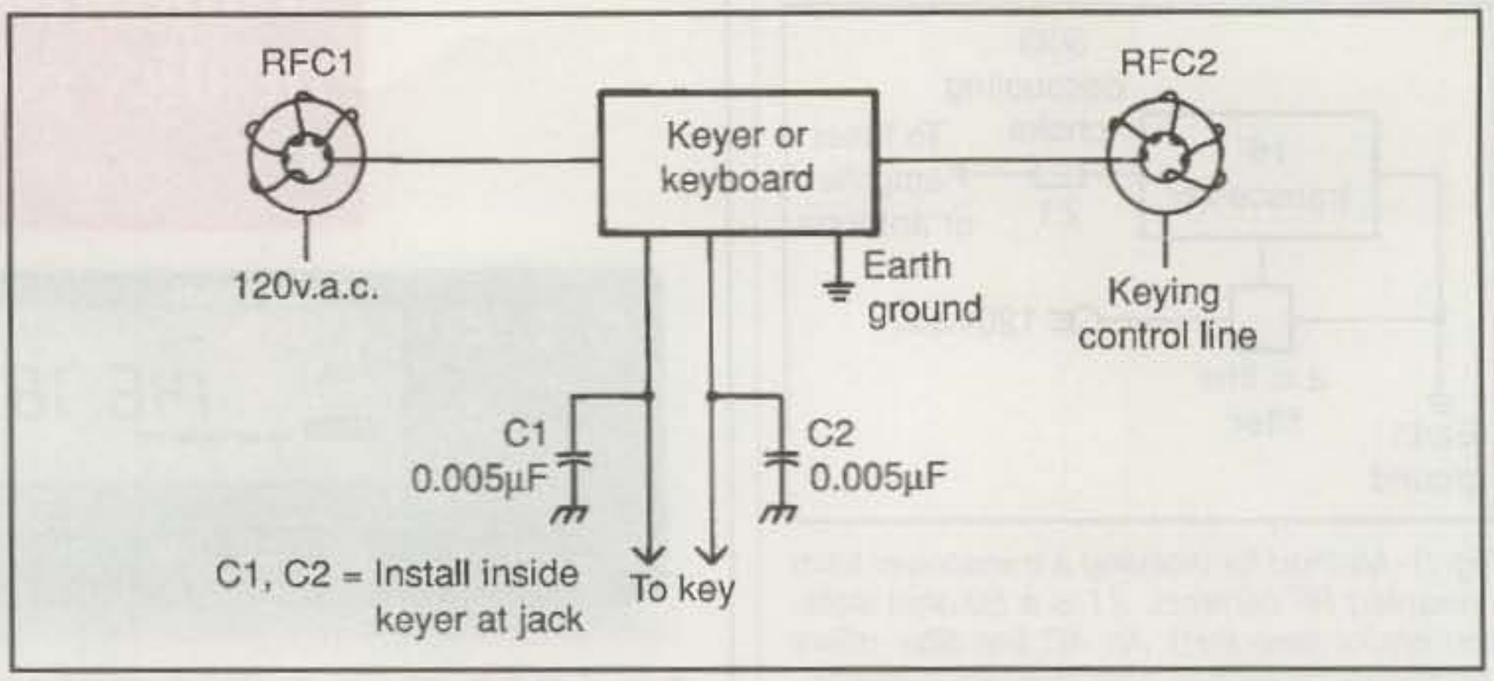

Fig. 4– RFC1 and RFC2 are hand-wound toroids that act as chokes to prevent unwanted RF currents from reaching a keyer or keyboard. C1 and C2 provide additional protection.

Notes

1. Doug DeMaw, W1FB, "Build a Low Cost Booster Microphone," *QST*, August 1989, p. 19.

2. The Radio Works, Box 6159, Portsmouth, VA 23703 (804-484-0140). Catalog available.

3. Amidon Associates, Inc., 3122 Alpine Ave., Santa Ana, CA 92704 (714-850-4660). Catalog available.

73, Doug, W1FB

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The Bearcat 9000XLT gives you pure scanning satisfaction with amazing features like TurboSearch™ to search VHF channels at 300 steps per second. This base and moble scanner is ideal for surveillance professionals because it has a selectable attenuator to help eliminate annoying intermodulation from adjacent frequencies in highly populated areas and selectable AM, Wide FM and Narrow FM modes that allow you to change the default receiving mode of the BC9000XLT. Other features include ***Auto Store*** - Automatically stores all active frequencies within the specified bank(s). ***Auto Recording*** - This feature lets you record channel activity from the scanner onto a tape recorder. **Hi-Cut filter** to help eliminate unwanted static noise. You can even get an optional ***CTCSS Tone Board*** (Continuous Tone Control Squelch System) which allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning enjoyment, order the following optional accessories: **PS001** Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter $14.95; **PS002** DC power cord - enables permanent operation from your vehicle's fuse box $14.95; **MB001** Mobile mounting bracket $14.95; **BC005** CTCSS Tone Board $54.95; **EX711** External speaker with mounting bracket & 10 feet of cable with plug attached $19.95. The BC9000XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited warranty from Uniden.

CB/GMRS Radios

The Maxon GMRS 210+3 transceiver is a PLL synthesized 10 channel radio on General Mobile Radio Service frequencies. It's the ideal radio for long range communications. Two repeater channels are programmable and one channel (462.675 MHz.) is set aside for emergency and safety communications. The seven remaining interstitial frequencies 462.5625, 462.5875, 462.6125, 462.6375, 462.6875 & 462.7125 MHz are all-purpose GMRS radio channels. 2 watts of RF power for exceptional transmitting range. Up to 5 watts when used with the supplied 12 volt vehicular DC power cord. CTCSS built-in. Includes 450mAh Ni-cad rechargeable battery pack, AC/DC wall battery charger, owner's manual, FCC license application, belt clip, antenna. Call 1-800-USA-SCAN to order.

Maxon GMRS210+3-U GMRS transceiver $188.95
SPECIAL Buy 2 or more GMR210+3 at $174.95 each
WTA3DT-U Ni-cad battery charger for WTA6GN4 & WTA6GN2 .. $58.95
WTA6GN4-U Ni-cad pack gives 4 watts power with 210+3 ..... $55.95
WTA6GN2-U Ni-cad pack gives 2 watts power with 210+3 ..... $29.95
WTA6GA-U Alkaline battery case - requires 6 AA batteries $9.95
WTA8GA-U Carrying case for Maxon GMRS210+3 ..... $29.95
WTA10G-U Speaker/microphone for Maxon GMRS210+3 ..... $18.95
WTA13G-U Push-to-talk mini-VOX headset for GMRS210+3 ..... $47.95
WTA14-U Antenna adaptor/screw-in male to BNC connector $9.95
ANT4GM-U 1/4 wave UHF magnetic mount mobile antenna $29.95
Cobra 2010GTLWX-U SSB base with weather alert† $379.95
Cobra 148FGTL-U CB with frequency counter $209.95
Cobra 29LTDWX-U CB with weather alert $114.95
Cobra HH40-U CB 40 channel handheld transceiver $99.95
Ranger RCI2950-U 25 watt 10 meter transceiver $239.95
Uniden GMR100-U GMRS handheld transceiver $144.95
Uniden WASHINGTON-U SSB CB Base († $25.00 shipping) $199.95
Uniden GRANTXL-U SSB CB Mobile $139.95
Uniden PRO538W-U CB & Weather $59.95

VHF Transceiver

RELM® WHS150-U Transceiver/SPECIAL

Mfg. suggested list price $481.67/**CE price $299.95**

Police and fire departments depend on the RELM WHS150 transceiver for direct two-way communications with their police, fire department, civil defense agency or ham radio repeater. The WHS150 is our most popular programmable five watt, 16 channel handheld transceiver that has built-in CTCSS, which may be programmed for any 39 standard EIA tones. Frequency range 148.000 to 174.000 MHz. Will also work 144.000-148.000 with slightly reduced performance. The full function, DTMF compatible keypad also allows for DTMF Encode/Decode and programmable ANI. Weighing only 15.5 oz., it features dealer programmable synthesized frequencies either simplex or half duplex in both 5.0 and 6.25 KHz increments. Other features include scan list, priority channel, selectable scan delay, selectable 5 watt/1 watt power levels, liquid crystal display, time-out timer and much more. When you order the WHS150 from Communications Electronics Inc., you'll get a complete package deal including antenna, battery, belt clip and user operating instructions. Other accessories are available. A leather carrying case with swivel belt loop part #**LCWHS** is $49.95; rapid charge battery charger, part #**BCWHS** is $69.95; speaker/microphone, part #**SMWHS** is $54.95; extra ni-cad battery pack, part #**BP007** is $59.95. The radio technician maintaining your radio system must order programming instructions part #**PI150** for $18.00 to activate this radio. FCC license required for United States operation.

Other neat stuff

PH5000-U Waber 500VA/340 Watt computer uninterruptable power supply $159.95
WX70-U weather radio with National Weather Service storm alert $29.95
WB-U USA Today The Weather Book, Guide to USA weather by Jack Williams $15.95
PSUN-U Partly Sunny, Weather Junkie's Guide to Weather by Alan Fields ... $11.95
Grundig Yacht Boy 400-U digital portable shortwave - 40 memory $179.95
Grundig Yacht Boy 230-U portable shortwave receiver $109.95
Sangean ATS800-U portable 20 memory shortwave receiver $69.95
Sangean ATS803A-U portable shortwave w/AC adapter – 9 memory $129.95
Sangean ATS808-U portable 45 memory shortwave receiver $129.95
Uniden EXP9200-U 900 MHz. 1 or 2 line spread spectrum cordless phone . $289.95
Uniden EXP9100-U 900 MHz. 1 line cordless spread spectrum telephone ... $224.95
Uniden EXP901-U 900 MHz. 1 line cordless analog telephone $149.95
Bogen FR3110-U Digital FAX Friday Fax-on-Demand & answering system ... $399.95
Bogen FR3020-U memory module for Fax Friday/up to 36 minutes $99.95
Bogen FR2000-U Digital two-line voice mail & answering machine $279.95
Bogen FR0018-U memory module, doubles recording time to 36 minutes ... $79.95
FANS P161P-U 60 name/number caller ID, unwanted call blocker, paging .. $149.95
SNI ID200-U Bouncer name/number caller ID, call reject, forward $89.95
ICOM GP22-U handheld global positioning system (GPS) $489.95
RELM WHS150-U VHF handheld 5 watt, 16 channel transceiver $299.95
RELM RH256NB-U VHF 25 watt, 16 channel synthesized transceiver $289.95
Ranger RCI2950-U 25 watt 10 meter ham radio transceiver $239.95
Cobra RDL712SW-U Safety Alert & Super Wideband Laser/Radar receiver .. $139.95
Uniden LRD63995W-U Super Wideband Laser/Radar receiver-VG2 protection $99.95
ANTK-U VHF scanner/VHF transmitting antenna PL259 connector $29.95
ANTMMBNC-U magnet mount scanner antenna w/ BNC connector $29.95
ANTMMMOT-U magnet mount scan antenna w/Motorola plug $29.95
ANTMMPL-U magnet mount scan antenna with PL259 connector $29.95
ANTSGBNC-U glass mount scanner antenna with BNC connector $29.95
ANTSGMOT-U glass mount scanner antenna with Motorola jack $29.95

Buy with confidence

It's easy to order from us. **Mail orders to:** Communications Electronics Inc., P.O. Box 1045, Ann Arbor, Michigan 48106 U.S.A. Add $15.00 per radio product or weather station for U.P.S. ground shipping and handling in the continental U.S.A unless otherwise stated. Add $10.00 shipping for all accessories and publications. Add $10.00 shipping per antenna. For Canada, Puerto Rico, Hawaii, Alaska, Guam, P.O. Box, or APO/FPO delivery, shipping charges are two times continental U.S. rates. Michigan residents add state sales tax. No COD's. Satisfaction guaranteed or return item in 31 days for refund, less shipping. 10% surcharge for net 10 billing to qualified accounts. All sales are subject to availability, acceptance and verification. Prices, terms and specifications are subject to change without notice. We welcome your Discover, Visa, American Express or MasterCard. Call anytime 1-800-USA-SCAN or 800-872-7226 to order toll-free. Call 313-996-8888 if outside the U.S.A. FAX anytime, dial 313-663-8888. For technical assistance, call our technical support hotline for $2.00 per minute at 1-900-555-SCAN. Dealer and international inquiries invited. Dial 313-663-8888 for fax-on-demand info.

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CIRCLE 159 ON READER SERVICE CARD

BILL'S BASICS

BY BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Goodies In Time For The Holidays—Part I

This article contains information about amateur radio specialty items. I have included a wide variety of items which amateurs can wear and use, and which make good gift ideas. Equipment and accessories directly related to signal reception and/or transmission are not included in this article. Where prices are shown, they are included only to provide some idea of cost; exact current costs should be requested from the seller before ordering any item. State sales taxes may apply, but they are not included in this article. Also, prepaid charges only apply to shipments made to U.S.A. addresses. If you are aware of similar items which should be included in articles of this type, please send such information to my California address, as it appears on this page.

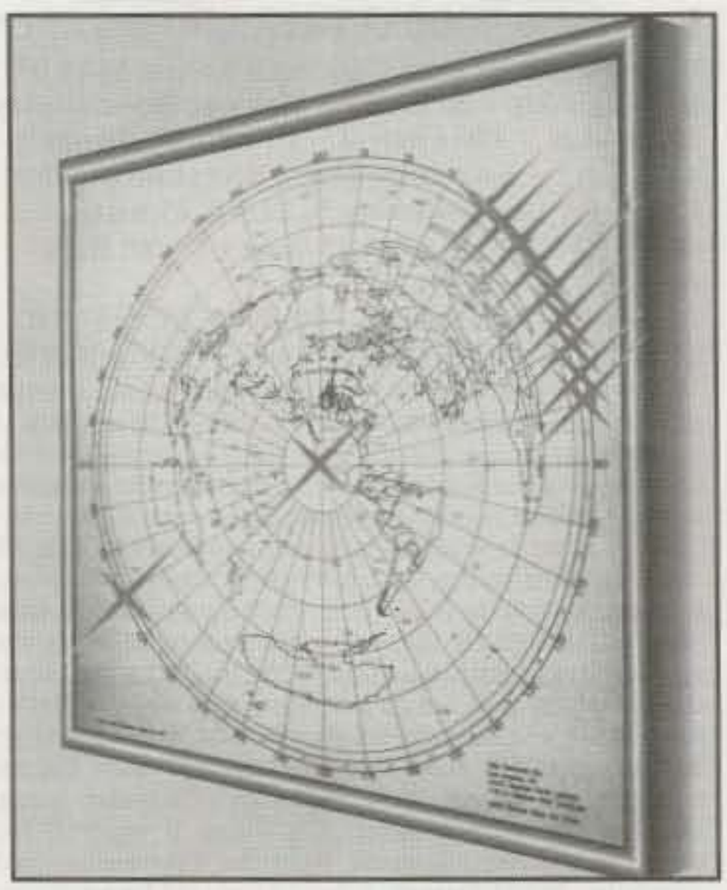
ARRL. The American Radio Relay League (ARRL) has a nice assortment of items. Most of the League items are only available to members. These items are listed in this article for the benefit of ARRL members. Amateur Radio Emergency Service (ARES) items are available as follows: (a) black and gold stickers or red, white, and blue stickers at $1 each. Black and gold decals or red, white, and blue decals at $1 each. Black and gold patches, or red, white, and blue patches, at $3 each. The 5 inch member (diamond) decals at $1. Life member decals (5 per package) at $1. ARRL flag license plate at $5. Cloth ARRL flag patch at $5, and 4 inch ARRL diamond patch at $2, life member 4 inch diamond patch at $1.25. ARRL flag pin at $5, membership pin at $3, and life membership (replacement) pin at $3. Life membership plaque at $25. Set of 50 ARRL member letterhead stationery sheets with 50 matching business size (#10) envelopes at $8. Fifty pieces of stationery at $4 or 50 envelopes (separately) at $5. Spark to Space items are available as follows: hats at $7 and patches at $3. Exact details can be requested from ARRL, Publications Sales, 225 Main Street, Newington, CT 06111 (phone 203-594-0215; FAX 203-594-0303).

The ARRL letter is issued biweekly for ARRL members. A sample copy is available to any member who sends an SASE with the request. The one-year subscription rate is $19.50.

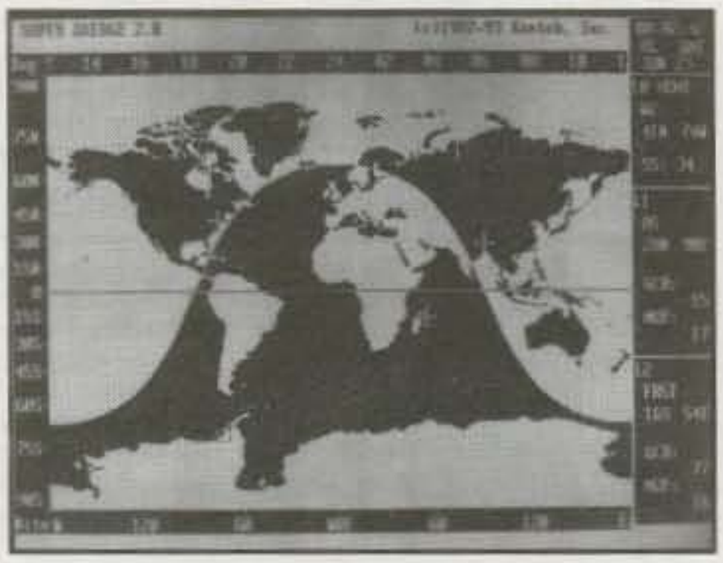
Backpacks. (See *CQ*.)

Badges. Blue Ridge Office Products offers an extensive assortment of badges, plaques, rubber stamps, and signs. Their custom engraved badges are available in 8 styles with 3 fastener types. The desk signs are sold in 9 styles. Two types of plaques and 3 styles of stationery embossers are also marketed by Jonathan Lee, KD4ZSD. Self-inking stamps are sold in 7 styles. Pre-inked stamps are available in 10 types. Heavy-duty self-inking metal stamps are sold in 10 styles. Their 16-page catalog provides details about their product line.

45527 Third Street East, Lancaster, CA 93535-1802



Vector Control Systems Beam Indicator.



The Super DX Edge 2.0 from N2UN.

Their phone number is 540-948-3204. Their address is RR1, Box 18, Madison, VA 22727.

Curiosity Sales markets full-color engraved callsign tags. Custom designs are available. A sample is available at $3. Customized patches and pins are also sold. Their address is 211 Main Street, Norway, ME 04268 (phone/FAX 207-743-7799).

LQV Engraving markets callsign desk plates, identification badges, and small signs. These items are available in a wide variety of colors, fasteners, and sizes. Your request (with SASE) will bring a data sheet with prices. The address is P.O. Box 4133, Overland Park, KS 66204-0133. J.L. "Mac" McCoy, WØLQV, runs this company.

Ron Van Horn, KA8PBB, owns PBB Engraving, 24 Hitching Post Road, Union, OH 45322 (phone 513-836-2932; FAX 513-836-8225). His product line includes desk nameplates (aluminum and walnut), desk nameplate inserts, door signs, hall/corridor signs, hot foil

Amateur Radio Excellence's desk/wall clock.

stampings, identification badges, key tags, magnetic signs, pen sets, and plaques. His name and callsign badges feature purchaser's choice of the emblem of any MLB, NBA, or NFL team.

(Also see Caps Unlimited/Patches; Trophies by Edco/ Trophies; and W5YI Group.

Banners. (See Old West Graphics/Clothing.)

Beam Headings. Forest L. Addis, K4UAR, offers a 25-page alpha-numeric list showing beam headings to 568 DX locations in 326 DXCC countries and 707 domestic locations relative to one's home station location. His list includes prefixes, locations, short-path headings, long-path headings, beam return headings, intervening distances, latitudes, and longitudes. The price is $10 and the address is 2291 Midvale Circle, Tucker, GA 30084 (phone 404-938-6816).

Vector Control Systems offers a plastic laminated Great Circle Map of the Earth. The overall size is approximately 22.5 inches (wide) by 21.5 inches (high) with a pertinent (information) size of about 20.25 (wide) by 19.5 (high) . The diameter of the Earth presentation is 18 inches. The continents are outlined in black against a white background, and the countries are outlined in green. Amateur radio callsigns of countries are shown in red. Your stated location is shown at the center of the map with lines every 10 degrees showing true beam headings to all parts of the world. Distances are shown by 2000 mile rings centered around your station. It is priced at $35, including shipping and handling charges. A customized beam heading DXCC list is included at no extra charge. This map is a useful and decorative addition to one's shack. The address is 1655 N. Mountain, Suite 104-45, Upland, CA 91784 (phone 909-985-6250; FAX 909-985-3482).

Jack Hurray, W8JBU, offers laserjet-printed beam headings from one's QTH in three versions. The DXCC version is $9.95. The DXCC/WAS version is $12.95. A deluxe com-

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High quality, rugged, reliable, crossbar protection, offering easy accessory connectors, cig plug and meters on most models!!

	PS120M	PS140II	RS300	RS40X	PS50TM
Voltage (VDC)	3-15	13.8	1-15	1-15	13.8
Current (ICS)	12	14	30	40	5.2
Current (cont.)	9.2	12	24	32	4.2
Ripple(max.)	3mV	3mV	3mV	3mV	3mV
Regulation	1%	1%	1%	1%	2%
Cooling Fan	NO	NO	NO	YES	NO
Size(inch.)	5x4x9	5x4x9	7x6x9	11x5.5x9	6x3x9
Weight (lbs.)	11	11	18	22	6
Meter	YES	NO	YES	YES	YES

PS-220

• NEW from Daiwa! Has 16 continuous amps, 20 amps max and you get the same rugged quality you've come to expect from Daiwa.

Daiwa's Accessories offer exceptional quality and at very competitive prices!

DAIWA Headsets

EX-700

• Earphone Mic for Transceivers •

Daiwa's unique flexible ear clip is used to ensure comfortable and firm fitting, making it very practical and ideal for commercial use.

EX-800

• Cap Clip Mic for HandHelds •

User-adjustable clip, Hands free operation, Compact and Lightweight, High sensitivity Microphone for excellent Modulation.

PM-100

• Clip Mic •

Clip-On vest Microphone for Transceivers

Daiwa Switching Power Supply

Compact, Lightweight, Highly Efficient, 40amp supply Auto Switching - 100-117V or 220-240V Input 70 - 132V or 140-264V; crossbar protection.

SS-404

Capable of delivering 40A at all DC output voltages. Additional models are available, CALL today!

SWITCHES

• Professional Cavity Type Coaxial Switches •

	CS201	CS201GH	CS401/401G
Freq.	600Mhz/1Ghz	2Ghz	800MHz/1.3GHz
Isolation	60 dB 600MHz	50dB 1 GHz	60dB 300 MHz
Conn.	SO239	N	N

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• Famous Cross Needle Meters •

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CN410M - Mobile 3.5-150MHz • **CN460M** - Mobile 140-450MHz • **CN465M** - Mobile 140-450MHz

BASE

CN101 1.8-150MHz • **CN103M** 140-525MHz w/ UHF Conn • **CN103N** 140-525MHz w/ N Conn.

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CNW 727N 140-150 (220W) & 430-450MHz (150W)
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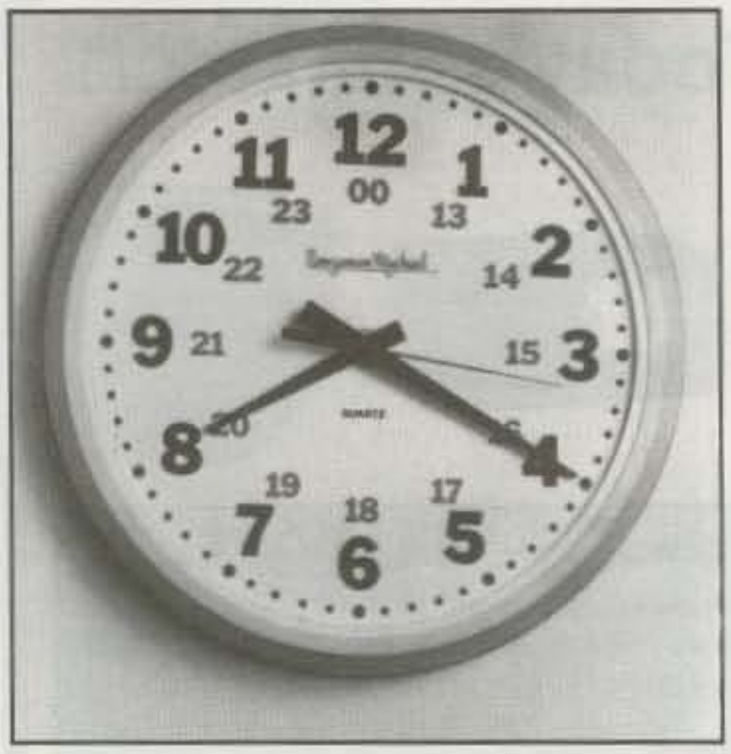


The 24 hour clock available from B.A. Fox, Inc.

bination DXCC and WAS version, printed on cotton fiber paper and presentation-bound with heavy cover stock, is $19.95. Their address is Box 397, Hinckley, OH 44233-0397.

The DX Edge and the Super DX Edge are available at $24.95 and $29.95 each, respectively. These operating aids show short- and long-path bearings between any two locations on Earth without involving the use of calculations or tables. They are useful at all stages of the sunspot cycleand can improve DX operating results. Tony Japha, N2UN, sells these operating aids. His address is P.O. Box 834, Madison Square Station, New York, NY 10159 (phone 212-673-7646).

Belts. Leather & West sell custom-made hand-tooled leather products with one's name, initials, and/or callsign on them. Belts, hanging signs, key rings, purses, and wallets are a few of the available products. Their belts are priced at $30.90 each and are available in lengths up to 84 inches. Belts over 44 inches cost an additional $10. Shipping fees are included in these stated prices. Their address is 67 Causeway Rd., West Swanzey, NH 03469 (phone 603-352-6256).

Highland Leather offers callsign belt buckles and customized leather belts. They also make customized wallets, checkbook covers, logbooks, and key rings. Latigo leather is used to make the belts and the designs are hand tooled. Their address is 3189 Cherokee Ave., Merced, CA 95340 (phone 209-722-7932).

Bumper Stickers. (See Richard Guthrie/ Decals.)

Calendars. (See *CQ*.)

Clocks/Watches. Amateur Radio Excellence sells a 9 inch square by 2 inch thick desk or wall clock with laminated original artwork plus one's callsign. This clock includes a quality quartz movement that is powered by an included single AA battery. The clock face shows an antique radio, handkey, earphones, and microphone, plus 1 to 12 and 13 to 24 time indications. The price is $44.49, including domestic shipping charges. The frame is available in a choice of simulated walnut, simulated light oak, or black leather. The address is Box 1551, Manchester, NH 03105.

Many radio operators are familiar with the special clocks used in radio shacks aboard ships. These 6 inch diameter clocks are new and the real thing, but they are not cheap. The black phenolic quartz (40101) and electric (20881) clocks cost $249 and $549, respectively. The brass quartz (40100) and electric (20880) clocks are priced at $486 and $786, respectively. These special clocks show the international silent periods (15–18 and 45–48 minutes past each hour) highlighted in red. Eight-and-a-half inch versions of black phenolic mechanical (20874) and quartz (40094) radio-room clocks are special order. They are available from Baker Lyman and Company, Inc., P.O. Box 838, Metairie, LA 70004 (phone 504-831-3685; FAX 504-831-3786).

Larry Abelkop, WA4LPV, runs B.A. Fox, Inc., which is a distributor of the Seth Thomas clocks popular with amateurs. His model 708 clock features a 24 hour face, quartz movement, step second hand, and a shatter-resistant face. The model 710 is the same as the model 708, except it has the standard 12 hour face. The 708 and 710 clocks are 2.75 inches deep and 14 inches in diameter. The 708 and 710 clocks sell at $34.95 each, which includes s&h to domestic addresses. The model 2616 sells at the same price as the 708 and 710. The 2616 has large (1.8 inch) red LED numerals which display either 12 or 24 hour time. This clock is mounted in a wood-grain case which has a flip-out stand for desktop use. Battery backup capability, plus a battery-low backup indicator, are included in this 6.5 × 9.5 × 2.125 inch clock. The Station Master sells at $53.45, including s&h fees. This 12/24 hour LCD clock shows seconds, minutes, and hours. It offers five features including alarm, countdown timer, and stopwatch. Their address is B.A. Fox, Inc., P.O. Box 6206, Spartanburg, SC 29304-6206 (phone 803-582-6464; FAX 803-582-6744).

Gabay Tool offers UTC and local-time wall clocks at $26.50 and $14.65 each, respectively, ppd. George Gabay, N9QQR, initially made these clocks just for use in his own station. His address is West 5541 Buckhorn Drive, New Lisbon, WI 53950.

Geochron Enterprises offers four models of their world time indicator. Each model displays daylight and darkness, sunrise and sunset, correct time in each zone, day of the week and date of the month. These models are designed to hang on walls like a picture. Prices range from $1295 to $2465, plus shipping charges and costs of any desired accessories. Each model is 34 × 23 × 5 inches. Political boundary and time zone changes are updated and the Geochron map is updated yearly. Map updating kits are sold at $150 each. Their address is 899 Arguello Street, Redwood City, CA 94063 (toll-free 800-342-1661; FAX 415-361-1780.

Doug Siebert offers a hand-held time zone dial at $9 each, including s&h charges. His address is EZ Time, 1041 Georgean Street, Hayward, CA 94541 (phone 510-317-8506).

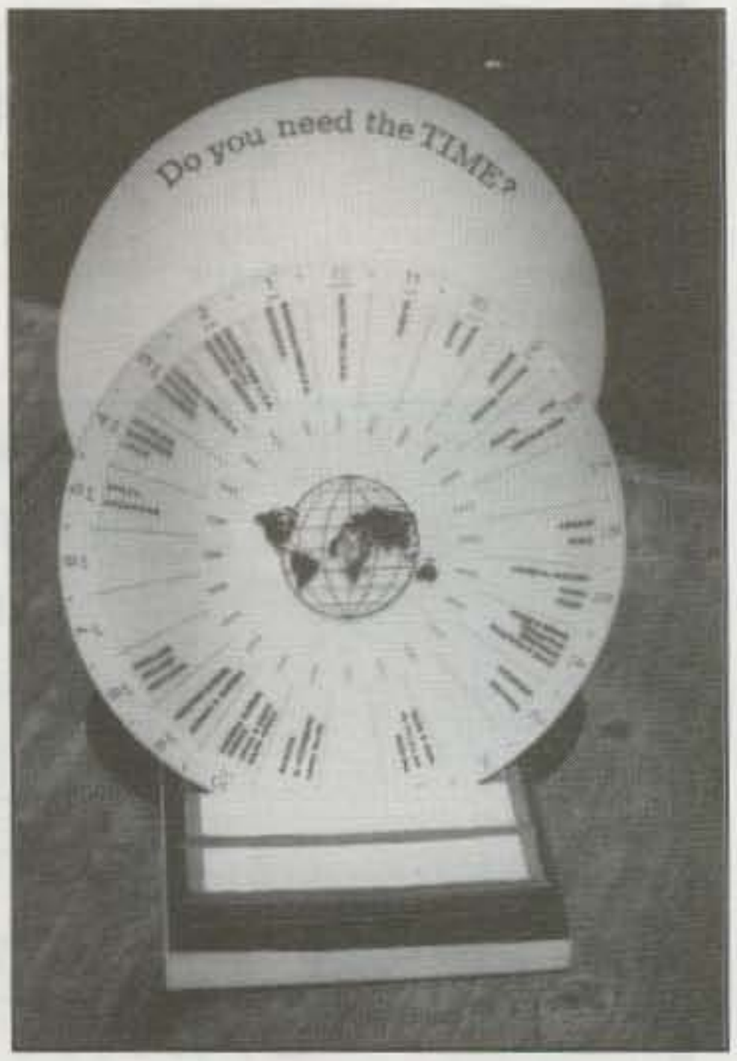
Tom Lang, KC6UEC, sells quality quartz analog wristwatches at $27.95, including s&h. These watches are in a yellow metal case and include a leather band. One's callsign is added to the face of the watch in one of six selectable styles: a tower, license plate, transceiver, and three HT configurations. Tom also sells vanity license plates and clocks. The address is Thomas Lang Company, 9438 East Broadway, Temple City, CA 91780-2445 (phone 818-287-5004). Allow one month for delivery.

MFJ sells 500 eyeball QSL cards at $39.95, plus s&h charges. These 2.0 by 3.5 inch "business" cards are particularly useful at conventions, radio club meetings, and other amateur radio events. The MFJ world map clock measures 2.5"H × 4.125"W × 2.25"D. The price is $24.95, plus s&h charges. The MFJ-112 shows the time and date at each worldwide location, and it allows one to see where each contact (amateur) is located. The MFJ-112 also shows the month, date, and year, plus the day of the week. Push-button switches enable one to easily move the display to any location in any time zone. It has a black map on a gold background. An additional feature of the MFJ-112 is that it includes an alarm. A nice coffee mug is available at $3.95, plus s&h charges. The MFJ and Ameritron logos are shown in red and blue ink, with one on each side of the cup. This is a nice door prize item at a low price. The address is MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762 (phone 800-647-1800; FAX 601-323-6551).

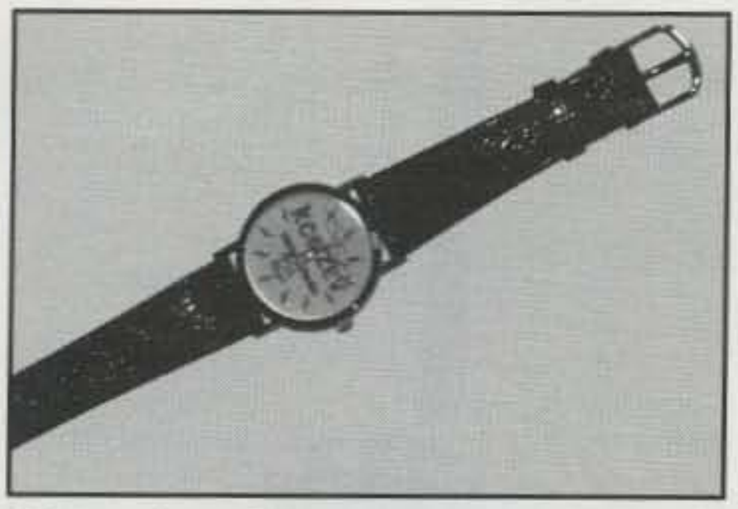
(Also see CQ; and Time & Again.)

Clothing. Adventure Bound Enterprises provides embroidered caps, jackets, golf-style sport shirts, and sweatshirts. Golf shirts are priced at $18 and sweatshirts at $20. Club logos with personalized callsigns are their specialty. Cap prices range from $8 to $10, depending upon type of cap (twill or mesh) and amount of embroidery ordered. Jackets cost $40 including s&h fees. The address is 467

One of the four world time indicators from Geochron Enterprises.



Hand-held time zone dial from EZ Time.



Thomas Lang Company's personalized call-sign watch.

MFJ's world map clock.

Quail Ridge, Warrenton, MO 63383 (phone 314-456-2213).

Herb Barber sells a golf-style fabric cap on which he embroiders one's callsign (block letters) and name (script) at $12.50, including s&h costs. Personalized embroidered patches are also available. His address is P.O. Box 02-5320, Miami, FL 33102.

Donovan Deily, WA3B, sells caps, license plates, mouse pads, mugs, and T-shirts. The caps are seamless with a 100% poly front. They are available in black, blue, green, red, and yellow and are priced at $10.95 each. The customized license plates are $19.95. Each mouse pad costs $15.95. The standard and mighty mugs are priced at $14.95 and $15.95 each, respectively. The stein costs $18.95. T-shirts are $16.95. The shipping cost is $2 per item. The mailing address is R.D. 2, Box 2088A, Todd Drive, Leesport, PA 19533-9653 (phone 610-916-4087).

Old West Graphics sells polo shirts ($21.95), sweatshirts ($26.95), and T-shirts ($16.95). Radio club logo price data is immediately available. Radio club die-cut and screen-printed decals are available, plus large banners. Waterproof convention signs can be written on using water markers. Vanity license plates cost $19.95, plus s&h fees. The address is 749 South Lemay, Suite A3-355, Ft. Collins, CO 80524-3251 (phone 800-579-0959; FAX 970-221-1184).

Personalized Photo offers caps, golf shirts, jackets, magnetic QSL cards, and T-shirts. The golf shirts have one's name and callsign embroidered on the left front; they sell at $18.95, with a $2 additional fee for the XXL size. They are available in green, navy, red, and white. The nylon coach's jacket is sold in black, green, navy, red, royal blue, and white. It features a drawstring waist, embroidered name and callsign (in white), lining, and snap closures at $24.95; add $2 for XXL. White QSL card T-shirts ($12.95), plus $2 more for XXL. Caps ($6.95) show your name and callsign in black lettering on a white front. Black, green, light blue, navy blue, red, royal, and white mesh cap colors. Other specialty items being sold by Al Jordon, WB1GKO, include white QSL sweatshirts ($18.95), plus $2 for XXL. QSL card plastic mugs for 3.5 x 5.5 inch standard cards cost $5 each. QSL card enlarged and transferred in color to a mouse/key pad at $10.95. Minimum s&h fee $3.50 or 5% of total order. The address is P.O. Box 370244, West Hartford, CT 06137 (phone 203-233-7277; FAX 203-236-3719). Shipping charges are extra over the stated prices.

Rusprint offers personalized caps, T-shirts, and mugs, plus plastic cardholders. The address is 26037 West 220th Terrace, Spring Hill, KS 66083 (phone 800-962-5783).

Paul Washa, WØTOK, sells T-shirts and sweaters featuring an enlarged reproduction of the 1964–1965 five-cent amateur radio stamp. T-shirts sell in all sizes (S, M, L, XL, and XXL) at $9 each. XXXL T-shirts cost $11 each. High-quality white sweatshirts sell at $22 each in sizes S through XL, at $25 each for XXL, and $27 each for XXXL. A second variation shows AMATEUR RADIO printed across the globe of our world and surrounded by ONE WORLD/ ONE LANGUAGE. These shirts are available in ash gray, jade green, light blue, red, royal blue, and white. T-shirts and sweatshirts sell at $12 and $25 each, respectively. XXL sweatshirts cost $28 each and XXXL sweatshirts cost $29 each. The desired size must be specified, of course. Paul also markets 140 books regarding electricity, electronics, and radio. If you are interested in books, request his current list, enclosing an SASE. Paul also sells pins ($5), key chains ($6), and money clips ($6) featuring the same amateur radio stamp. The address is 4916 Three Points Blvd., Mound, MN 55364-1245 (phone 612-472-3010).

Rod Williams offers a variety of personalized caps, jackets, and T-shirts. Each item can be embroidered to show callsign, name, and other information. His address is 3303 Holland-Sylvania Road, Toledo, OH 43615 (phone 419-843-2014. Rod offers a ten percent discount to clubs which place multiple item orders to be shipped to one address. His clothing line includes loom-run custom-embroidered patches, discus crew neck sweatshirts, discus sweat pants, flannel-lined warm-up jackets, fleece-lined baseball jackets, short-sleeve polo jerseys with or without pocket, solid twill baseball caps, superweight cotton T-shirts, two-button Henley jerseys, and zipper hooded sweatshirts. Name and callsign can be embroidered on each of the preceding items. For more information, request his catalog. Rod offers quick service.

The following items are available from Yaesu Sportswear, 3342 South Sandhill Road, P.O. Box 9-229, Las Vegas, NV 89121. Each item shows the Yaesu emblem and/or name. Crest is embroidered on corduroy caps ($15 each), jackets ($122 each), and white or navy blue polo shirts ($30.50 each). Silk screening is used on red, white, or navy blue T-shirts ($18 each). Jackets are silver polyester/cotton. The adjustable-size corduroy caps are navy blue or silver. Shipping charges are included. Allow 4 to 6 weeks delivery time. Write for a brochure if you are interested in these Yaesu-related items. Their phone number is 702-456-3609; FAX 702-456-3611.

(Also see ARRL; CQ; Publications; Vibroplex.)

The amateur radio sweatshirt available from Paul Washa, WØTOK.

Callsign mugs from Imagine That Graphics.

CQ Communications. *CQ* offers T-shirts with a choice of 12 print designs. These shirts are available in large and extra large sizes at $17.95. Extra extra large T-shirts are $2 more each. Sweatshirts are also sold with the same assortment of designs; they are priced at $27.95. The XXL price is $2 more.

The *CQ* 50th Anniversary polo shirt is being sold at $24 each in L and XL sizes. It is offered in black, green, or navy blue colors.

CQ offers T-shirts for kids at $17.95 each. All of these shirts are child's large size and six designs are offered.

Poplin baseball-type adjustable caps are sold at $12 each. The *CQ* logo is on the front of the cap with white lettering stating: "ONE OF THE CQ GANG—SINCE 1945." These caps are available in black, green, and navy blue.

The *CQ* backpack is available in black, green, or navy blue, and it sells at $31. It has two front pockets.

A 43 inch red and white amateur radio umbrella is priced at $14. It has the *CQ* logo on it. It folds and fits into a matching storage sleeve. Eleven-ounce porcelain mugs cost $7 each. One style shows the *CQ* logo and the other is marked *Popular Communications*. Leather *CQ* Amateur Radio coasters are priced at $2 each, or four for $7.

A *CQ* 50th anniversary wristwatch is being sold at $29. It is available in men's and women's styles with a black leather band. It features a 3-color imprinted face highlighting the 50th anniversary of *CQ*. The lens is mineral crystal and a silver-oxide battery powers it.

CQ Communications offers a large assortment of books (including the 486-page *CQ Amateur Radio Almanac* priced at $23.95) and video tapes ($19.95 each). They also have two versions of 15-month amateur radio calendars, one featuring classic gear and the other ham stations and antennas.

Shipping and handling charge is $2 for orders under $20, $4 for $20–$50 orders, and free above $50.

CQ's address is 76 North Broadway, Hicksville, NY 11801 (toll-free ordering phone number 1-800-853-9797; FAX 516-681-2926).

Cups/Mugs. Walt Flesher, KK6RG, markets callsign ceramic mugs showing one's name and/or callsign on one side ($17.95) or on both sides ($20.95). These prices include s&h. Their address is Imagine That Graphics, P.O. Box 2700, Anaheim, CA 92814 (phone 714-772-7484).

(Also see CQ; Donovan Deily/Clothing; Personalized Photo/Clothing; Rusprint/ Clothing; Vibroplex; and W5YI Group.)

Decals. Richard Guthrie, KA2JKA, is marketing a 3.5" × 5.5" HAM RADIO decal at $2 each, plus a self-addressed, stamped #10 business-size envelope. The decal's design is derived from the visual signal flags for letters "H" and "I." He also sells HAM ON BOARD bumper stickers and decals. These decals can be mounted inside or outside; order the type you want. His product line is being expanded to include a flag, hat, lapel pin, and stamps. His address is P.O. Box 46, New Baltimore, NY 12124.

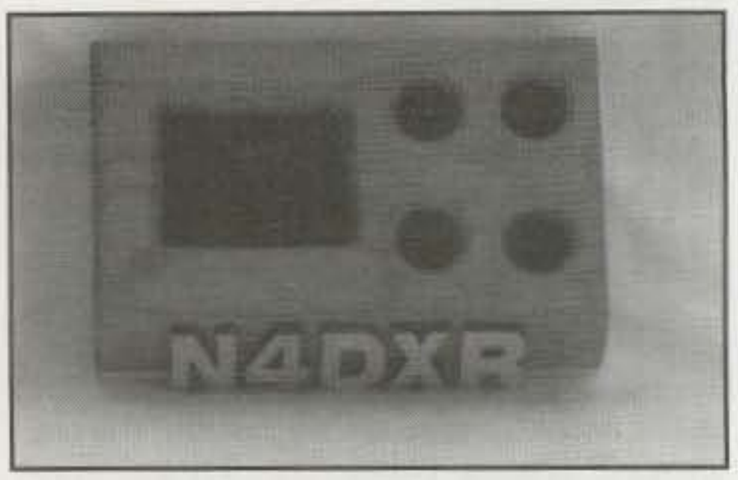
(Also see ARRL; Caps Unlimited/Patches; Lane 4 Awards/Plaques; Old West Graphics/ Clothing; and Time & Again/Maps.)

Gift Register. Tucker Electronics is running an amateur radio gift registry called The Log. An amateur obtains one of The Log registration forms and lists desired items on it. Examples of such items include accessories, antennas, books, HF equipment, and VHF/UHF equipment. Send the completed form to Tucker Electronics, 1717 Reserve St., Garland, TX 75042 (toll-free phone 800-527-4642; FAX 214-348-0367. One can quickly and easily update the submitted listing. This service may be of interest to amateurs in Texas. It can apply to all special events, not just to Christmas.

HT Stands. Handie-Base & More, Inc. markets a variety of desk-top radio stands, handheld radio brackets, meter brackets, meter stands, and antenna holders. The address is P.O. Box 2504, Broken Arrow, OK 74013-2504 (phone 918-357-2139).

Blaine Watkins, KB7VRD, offers a pair of alder wood bases which are designed to hold handie-talkies and antennas upright and in place. The single holder model is 6" × 3.5" × 2"; it holds up to four antennas and it sells at $16.45, including s&h charges. The dual holder model is 11.5" × 3.5" × 2"; it stores up to six antennas and sells at $19.45, including s&h charges. The HT drop-in slots are cut to meet the buyer's requirements with top edges of the HT and antenna cutouts routed to facilitate installation. The bottom end of the HT cutout is lined with rubber to cushion insertions. One's callsign is mounted at the front using 2 inch high letters cut from 0.125 inch thick birch. Each holder is sealed with two coats of polyurethane gloss to enhance its appearance. The address is Shack Attack, 1394 North 770 West, Orem, UT 84057-5903 (phone 800-573-7388).

The desktop scanner stand from Handie-Base & More, Inc.



Handie-Talkie stand from Shack Attack.

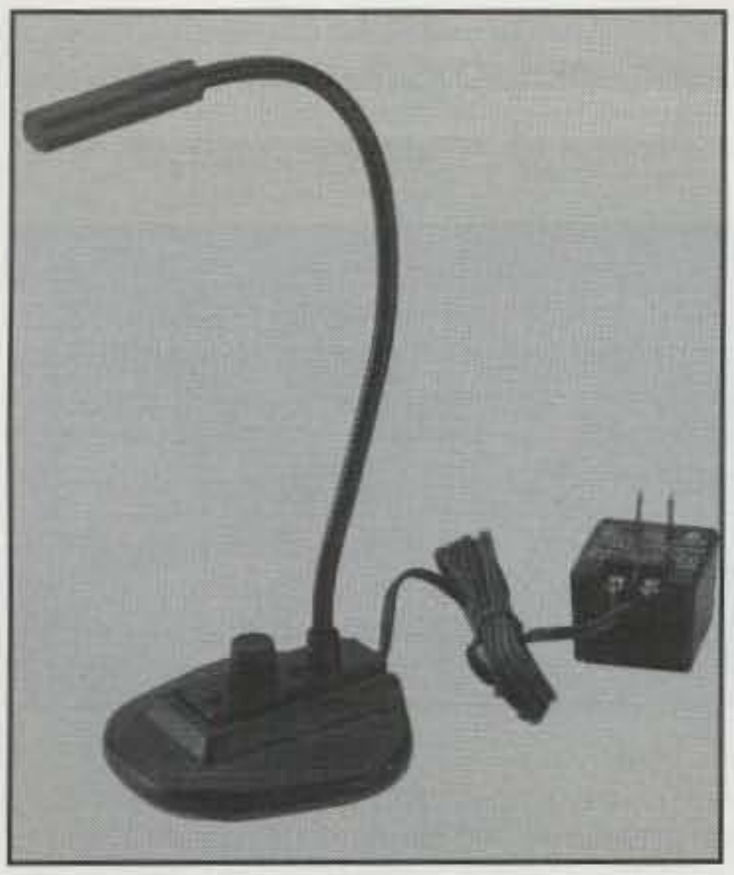
Key Items. George Chambers, KØBEJ, sells plexiglass covers for the Bencher ($11.95), MFJ-422 ($11.95), and Vibro-Keyer ($13.95) paddles, plus s&h costs. The address is 302 South Glendale Avenue, Coffeyville, KS 67337.

You can buy a 2.25" × 1.125" inch keychain showing your callsign on a miniature version of your state's vehicle license plate. The price is $5.25 each, including s&h charges. The address is Andrew Plaks, N6RKO, 3151 Fleetwood Drive, Riverside, CA 92503.

(Also see Camelia Trophy Shop/Plaques; Leather & West/Belts; PBB Engraving/Badges; Vail Correspondent/Publications; Vibroplex; Paul Washa/Clothing; and 7-Mike Hamstuff/ QSL Items.)

License Plate Items. See ARRL; Tom Lang/ Clocks; Old West Graphics/Clothing; and Mike Starr/Patches.

Lights. LITTLITE sells a simple variable- intensity desk lamp which can be operated on 12 VDC or 115 VAC. It has a weighted base and color filters available as accessories. This lamp is available in a variety of forms, and with a variety of accessories. The lamp can be secured in place using the snap mount supplied



The Littlite variable intensity desk lamp from Littlite/CAE, Inc.

with it. Also, screws are provided for use in mounting the lamp directly to a desired surface. A flyer can be requested from Littlite/CAE, Inc., 10087 Industrial Drive, P.O. Box 430, Hamburg, MI 48139 (phone 313-231-9373; FAX 313-231-1631).

Maps. FBenterprises sells repeater maps for all of North America. Individual state maps are priced at $3.95 each. Two meter repeaters are shown on one side with 220 MHz and up repeaters shown on the other side of each plastic laminated 5.5" × 8.5" map. Multiple state map sets are also available at $9.95 per set. The North American Repeater Atlas provides more than 150 pages of up-to-date information at $10. Shipping charges are extra. Details are available from FBenterprises, 23801 NW First Avenue, Ridgefield, WA 98642-8830 (phone/FAX 800-377-2339).

Maria Oosthuizen, ZS1AFZ, keeps Bellville available in the Republic of South Africa. She is the only known code-only YL active on the African continent. Maria became an amateur four years ago. She has already worked more than 212 DXCC accredited countries during more than 7000 code contacts. Maria has applied for the WPX award and just needs zone 2 to qualify for the WAZ award. She gives her highly desirable multiplier to amateurs operating the worldwide DX contests. Maria is a member of the ARRL and the YLRL, and she reads CQ regularly. She particularly appreciates seeing the photographs of active amateurs printed in this magazine.

Time & Again sells international time zone map decals in two sizes. The continents are shown in silver against a blue background on these durable polyester self-adhering decals. They can be displayed on one's radio equipment. The 2.25" × 4.75" decals cost $3 each. The 1.25" × 3.75" decals cost $2 apiece. A set of two decals (one each size) costs $4. Purchasers are requested to include an SASE with the orders. The address is P.O. Box 306, Dickinson, TX 77539 (phone 713-337-5319). Time zone maps are based on the concept that the Sun appears to pass through 15 degrees of longitude each hour. With 24 hours in a day and 15 degrees of movement per hour, 360 degrees of apparent sun movement occur each day. Each time zone is bracketed by a time zone to the East that is one hour ahead, and a time zone to the West that is one hour behind. World time zones became officially recognized by the International Meridan Conference in 1884. These decals are useful to anyone who regularly contacts people and groups in other parts of the world. Some of the world's major cities are shown on these decals. Full payment must accompany each order.

U.S. Scanner Publications offers a 25"H × 37"W world map which includes a lot of information useful to amateurs. A few of these features are the ARRL DXCC list, international callsign allocations, radio frequency allocation bargraphs, and Novice through Extra Class 2

CIRCLE 40 ON READER SERVICE CARD

◄ *Laminated two-sided state repeater map from FBenterprises.*

The variety of products from Caps Unlimited. ▼

through 160 meter operating privileges. Their address is P.O. Box 14923, Portland, OR 97214 (phone 1-800-890-7992; FAX 503-233-5176). Cost per map is $23.90, including s&h.

Medals. See Lane 4 Awards/Plaques.

Money Clips. See Paul Washa/Clothing.

Patches. Caps Unlimited sells a 2" × 3" embroidered SKYWARN patch with heat-seal adhesive backing. It shows a black tornado inside a fluorescent orange eye and it has the word SKYWATCH below the eye. This patch is also available on a black baseball-type summer cap. They sell the same kind of cap (one size fits all) with the words AMATEUR RADIO COMMUNICATIONS centered between a pair of lightning bolts in day-glo bright chartreuse. RACES decals are sold to RACES members. They are self-adhesive on the front side for attachment inside vehicle windows and windshields. It is advisable to request a copy of their sales data sheet to obtain detailed information regarding their entire product line. The address is P.O. Box 460118, Garland, TX 75046-0118 (phone 214-276-0413). They also sell identification badges and embroidered patches. Send an SASE if you request data.

Mike Starr, N8OVJ, sells 4.25 inch diameter red, white, and blue embroidered patches at $2.50 each. Amateur Radio Service Emergency Communications is embroidered in red lettering on a white background. Standard size license plates are priced at $5 each. Amateur Radio Emergency Communications is shown in raised red lettering contrasted against the orange background of the plate. Postpaid prices are stated. Special orders are welcome. The address is P.O. Box 203, 3420 Hadley Rd., Hadley, MI 48440 (phone 810-797-4150).

(Also see ARRL; Herb Barber/Clothing; Curiosity Sales/Badges; and Lane 4 Awards/Plaques.)

Mid-Article Summary

The concluding part of this article covers pendants, pens, pins, plaques, publications, purses, QSL items, ribbons, rubber stamps, safety items, signs, software, stationery, tie-tacs, trophies, umbrellas, Vibroplex, video tapes, wallets, and W5YI Group's products.

73, Bill, W6DDB

ASTRON CORPORATION
9 Autry
Irvine, CA 92718
(714) 458-7277 • FAX (714) 458-0826

ASTRON POWER SUPPLIES

• HEAVY DUTY • HIGH QUALITY • RUGGED • RELIABLE •

MODEL VS-50M

SPECIAL FEATURES

- SOLID STATE ELECTRONICALLY REGULATED
- FOLD-BACK CURRENT LIMITING Protects Power Supply from excessive current & continuous shorted output
- CROWBAR OVER VOLTAGE PROTECTION on all Models except RS-3A, RS-4A, RS-5A, RS-4L, RS-5L
- MAINTAIN REGULATION & LOW RIPPLE at low line input Voltage
- HEAVY DUTY HEAT SINK • CHASSIS MOUNT FUSE
- THREE CONDUCTOR POWER CORD except for RS-3A
- ONE YEAR WARRANTY • MADE IN U.S.A.

PERFORMANCE SPECIFICATIONS

- INPUT VOLTAGE: 105-125 VAC
- OUTPUT VOLTAGE: 13.8 VDC ± 0.05 volts (Internally Adjustable: 11-15 VDC)
- RIPPLE Less than 5mv peak to peak (full load & low line)
- All units available in 220 VAC input voltage (except for SL-11A)

SL SERIES

- LOW PROFILE POWER SUPPLY

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
SL-11A	•	•	7	11	2⅝ × 7⅝ × 9¾	12
SL-11R	•	•	7	11	2⅝ × 7 × 9¾	12
SL-11S	•	•	7	11	2⅝ × 7⅝ × 9¾	12
SL-11R-RA		•	7	11	4¾ × 7 × 9¾	13

RS-L SERIES

- POWER SUPPLIES WITH BUILT IN CIGARETTE LIGHTER RECEPTACLE

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-4L	3	4	3½ × 6⅛ × 7¼	6
RS-5L	4	5	3½ × 6⅛ × 7¼	7

RM SERIES

MODEL RM-35M

- 19" RACK MOUNT POWER SUPPLIES

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RM-12A	9	12	5¼ × 19 × 8¼	16
RM-35A	25	35	5¼ × 19 × 12½	38
RM-50A	37	50	5¼ × 19 × 12½	50
RM-60A	50	55	7 × 19 × 12½	60
• Separate Volt and Amp Meters				
RM-12M	9	12	5¼ × 19 × 8¼	16
RM-35M	25	35	5¼ × 19 × 12½	38
RM-50M	37	50	5¼ × 19 × 12½	50
RM-60M	50	55	7 × 19 × 12½	60

RS-A SERIES

MODEL RS-7A

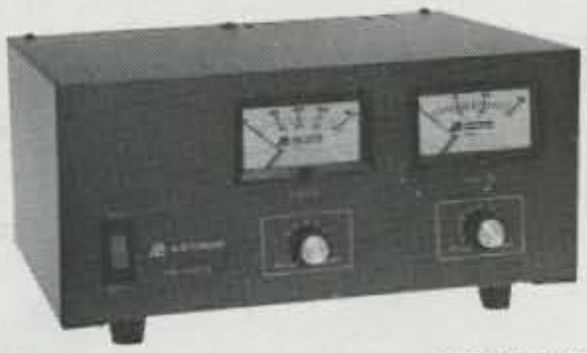
MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-3A		•	2.5	3	3 × 4¾ × 5¾	4
RS-4A	•	•	3	4	3¾ × 6½ × 9	5
RS-5A		•	4	5	3½ × 6⅛ × 7¼	7
RS-7A	•	•	5	7	3¾ × 6½ × 9	9
RS-7B	•	•	5	7	4 × 7½ × 10¾	10
RS-10A	•	•	7.5	10	4 × 7½ × 10¾	11
RS-12A	•	•	9	12	4½ × 8 × 9	13
RS-12B		•	9	12	4 × 7½ × 10¾	13
RS-20A	•	•	16	20	5 × 9 × 10½	18
RS-35A	•	•	25	35	5 × 11 × 11	27
RS-50A	•		37	50	6 × 13¾ × 11	46
RS-70A	•		57	70	6 × 13¾ × 12⅛	48

RS-M SERIES

MODEL RS-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
• Switchable volt and Amp meter				
RS-12M	9	12	4½ × 8 × 9	13
• Separate volt and Amp meters				
RS-20M	16	20	5 × 9 × 10½	18
RS-35M	25	35	5 × 11 × 11	27
RS-50M	37	50	6 × 13¾ × 11	46
RS-70M	57	70	6 × 13¾ × 12⅛	48

VS-M AND VRM-M SERIES



MODEL VS-35M

- Separate Volt and Amp Meters • Output Voltage adjustable from 2-15 volts • Current limit adjustable from 1.5 amps to Full Load

MODEL	Continuous Duty (Amps) @13.8VDC	@10VDC	@5VDC	ICS* (Amps) @13.8V	Size (IN) H × W × D	Shipping Wt. (lbs.)
VS-12M	9	5	2	12	4½ × 8 × 9	13
VS-20M	16	9	4	20	5 × 9 × 10½	20
VS-35M	25	15	7	35	5 × 11 × 11	29
VS-50M	37	22	10	50	6 × 13¾ × 11	46
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5¼ × 19 × 12½	38
VRM-50M	37	22	10	50	5¼ × 19 × 12½	50

RS-S SERIES

MODEL RS-12S

- Built in speaker

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* Amps	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-7S	•	•	5	7	4 × 7½ × 10¾	10
RS-10S	•	•	7.5	10	4 × 7½ × 10¾	12
RS-12S	•	•	9	12	4½ × 8 × 9	13
RS-20S	•	•	16	20	5 × 9 × 10½	18
SL-11S	•	•	7	11	2¾ x 7⅝ x 9¾	12

S—Intermittent Communication Service (50% Duty Cycle 5min. on 5 min. off)

WORLD OF IDEAS

BY DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

TVI, RFI, and CRI—A Modern Perspective

As this column's title indicates, our main purpose is highlighting a wide variety of ideas and areas of special interest to enhance your enjoyment of amateur radio. QRP, keys, classic rigs, and mobiling are always popular topics, yet we occasionally need to look in other directions to ensure everyone is still "with us" and having a ball on the air. This month's column therefore features a mini-collection of time-proven tips and ideas for minimizing interference among amateur gear, televisions, telephones, home computers, and microprocessors in cars. Hopefully, this collection of solutions to unusual problems will prove beneficial when and if they are needed. Some of our upcoming tips have appeared in past columns, books, and articles, while others simply have not been given as much consideration and recognition as they deserved. Having both in one easy-to-recall place, however, will be useful to everyone. As a wise, old broadcast engineer once told me, the difference between a top-notch engineer and an only-average engineer is the ability to quick-reference (or remember exactly!) a wealth of information precisely when needed.

At some unpredictable time, almost every amateur is faced with some type of interference problem other than conventional TVI. Such unusual entanglements are the main focus here, not typical TVI, which is a world of its own and has been addressed by many well-known pros on the subject, such as W1ICP. I do not wish to infringe on their sacred ground. I am simply sharing information and notes on unusual interference sources and cures acquired over time and through working with others on problems.

Now for simplicity, let's separate this discussion into categories of television interference (for referencing what it is, and for discussing sheer RF overloading), RF interference (including RF feedback), and computer-related interference (such as radiated "birdies"). It's time to get started!

Classic TVI

In the past (especially when vacuum-tube rigs and random-wire antennas were king) TV interference was recognized by Zs or herringbone lines in a received picture. The most common cause of this problem was inadequate transmitter harmonic suppression or poor connections between the rig, antenna, and/or ground. Removed cabinet screws or frayed shields on cables (or no shields!) were known to make these problems more difficult to find and fix.

Improved output filtering and better harmonic suppression in recent fully solid-state transceivers have significantly minimized classic-style TVI today. That does not mean TVI does not occur, however, even when using a fancy new transceiver. Still often-overlooked faults, for example, are loose or corroded coax-to-antenna and/or rig-to-ground connections. Even corrosion on an outdoor TV antenna in the vicinity of an amateur transmitting antenna can produce classic TVI (on its connected TV set). Read those last sentences again; then ask yourself:

1. Are all of your own station's interconnecting cables electrically solid and all unnecessary cables (that can carry "secondary ground paths") removed?

2. Do you habitually look to confirm "all is right" rather than actually hunt for "what is wrong" when analyzing problems? No offense, but if everything is indeed right, a problem (TVI, in this case) will not exist. Many TVI (and other electronic) problems have been solved quickly merely by looking at them from a different angle. Honest!

4941 Scenic View Drive, Birmingham, AL 35210

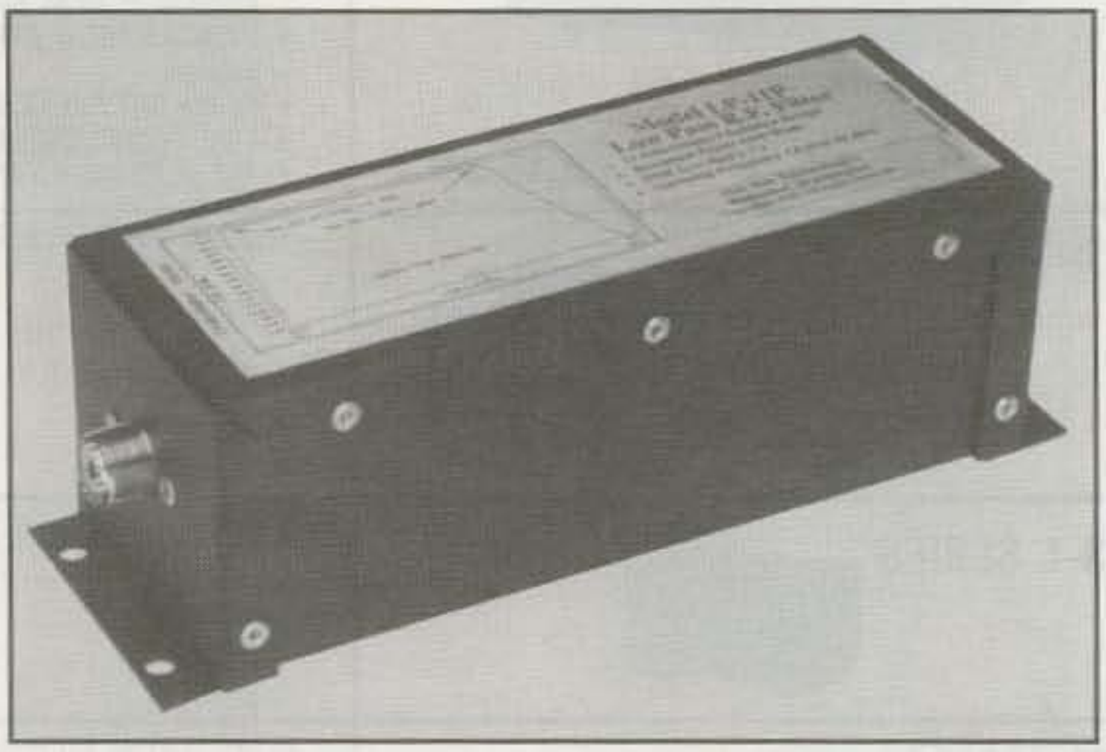


Photo 1– The most significant first step an amateur can take in minimizing TVI is adding a good low-pass filter on his or her HF transceiver's or linear amplifier's output. The item shown here is Oak Bay Technology's model LP11P. It has multiple filter sections and does a superb job of reducing harmonics and spurious radiation.

At this point you are probably asking, "What constitutes a 'modern solid-state transceiver with good TVI suppression?'" There is not a specific line dividing models here, and again I must emphasize all other station gear must be "clean" to avoid false interpretations. Ahh, but suppose any one of these nice, modern transceivers is connected to an old linear amplifier, weather-beaten antenna, etc. Classic TVI may then result. Whether it completely alleviates the problem or not, a good multi-section low-pass filter such as the Oak Bay Technologies LP-11P shown in photo 1 is highly recommended. This is one of the most impressive (greatest spurious/harmonic suppression above 30 MHz) low-pass filters I have seen. I might also add that permanently installing a low-pass filter

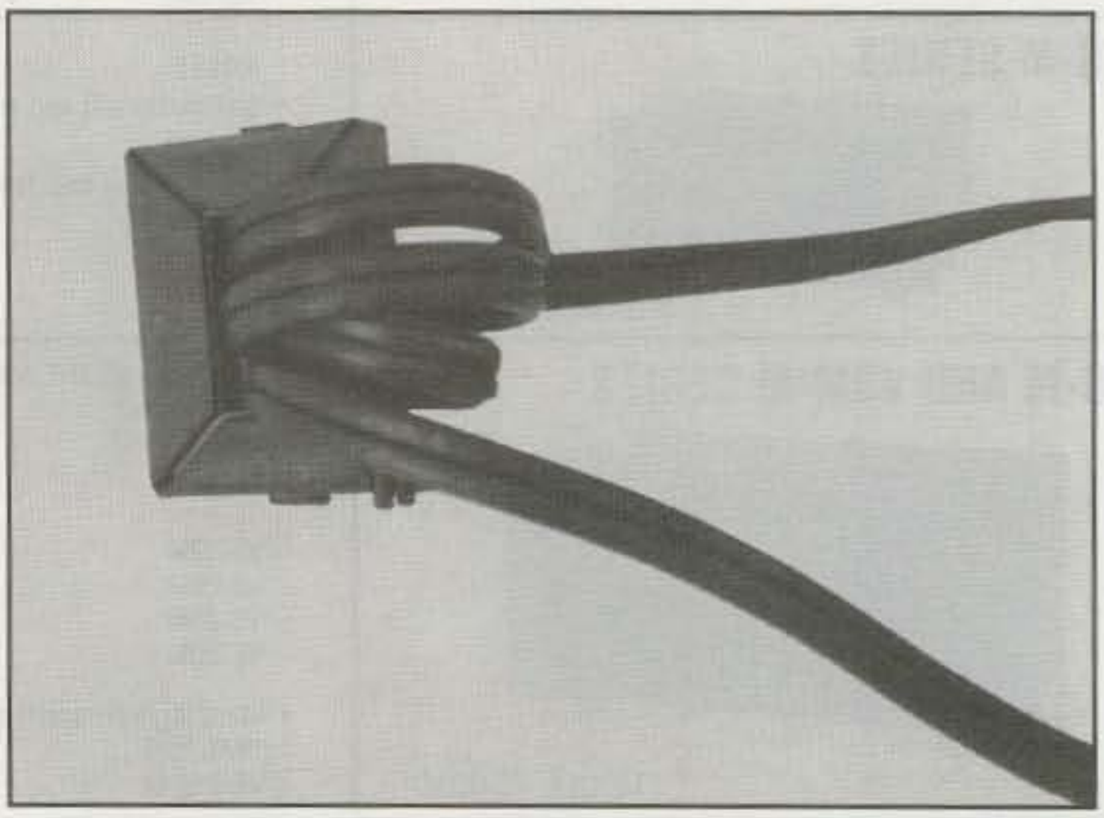


Photo 2– Adding snap-on toroids to your equipment's power and control cables often prevents them from acting as phantom antennas and causing RF feedback. For best results install toroid(s) right at back of equipment, where cables enter the cabinet. (See text.)

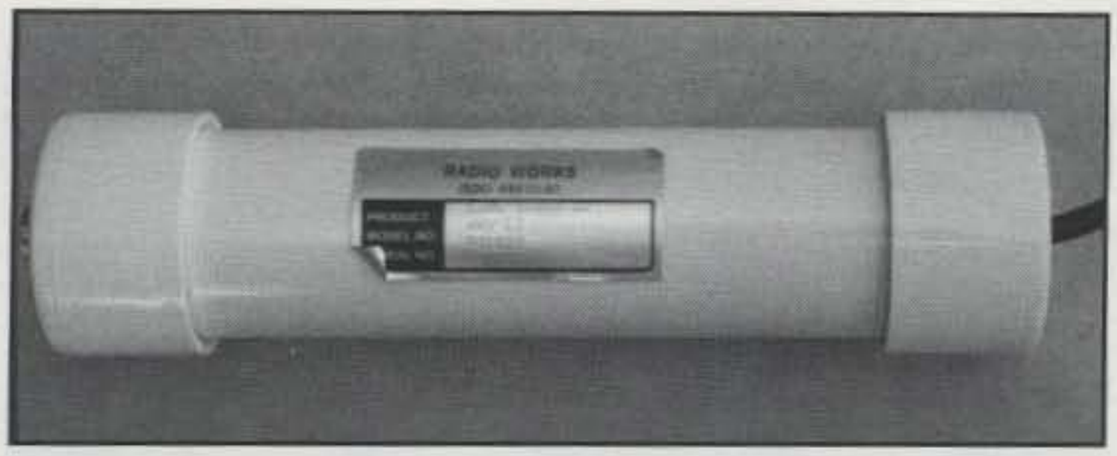


Photo 3– Coax cable is designed to carry RF energy to your antenna, but energy often emanates from its shield. The Radio Works 4KRF-LI Line Isolator shown here does a superb job of minimizing that radiation.

on the output of your station is always desired as an ethical anti-TVI measure everyone recognizes.

RFI

This area of interference involves transmitted RF energy "getting into" telephones, home or car electronics, or even back into amateur gear generating the RF energy. The latter case is called "RF feedback" and usually results in erratic meter readings, distorted transmissions, and RF-hot cabinet screws. What causes it?

Generally, much of your transmitted signal is going in the wrong direction (into your house or car rather than toward the sky). Once again moving the antenna or reducing power so signal strength to near-field electronic devices will decrease is the proper (but not always the feasible) answer. Don't prematurely jump to conclusions and "easy fixes," however.

Maybe you should first consider turning a disadvantage into an advantage. How? Suppose you are using a ground-mounted vertical close to your house and/or a neighbor's house. Its maximum radiation is broadside to the element, with minimum radiation off its ends, so moving it to atop the roof can solve two problems at once. Likewise, moving a dipole from right over the roof to where its end points toward the house is clever thinking. Now let's talk about alternate cures.

I have found among the best solutions to telephone interference are the RF-1 and RF-2 filters made by K-Com of Box 82, Randolph, OH 44265. The units are fitted with standard RJ-11 plugs and jacks so they can be quick-connected at the telephone proper.

Problems with unshielded house wiring and long AC power cords on appliances acting as phantom antennas can cause toasters to overheat, lamps to brighten, or fans to increase speeds as you transmit. The quick fix here (and it is applicable to dozens of other situations) is wrapping three or four turns of an affected unit's AC cord around a snap-on toroid, as shown in photo 2. Four-packs of toroids are made by MFJ Enterprises and come supplied with good tip sheets on their use for choking out RF; they are available from amateur radio dealers nationwide. Snapping a couple of these toroids onto your transceiver's power cord and antenna coax, one on your rotor's cord, and one on your TV set's cord is a good RFI, TVI, and RF feedback prevention measure everyone should consider "standard practice."

Adding toroids on cables in mobile setups also works wonders for harmonious co-existence of amateur gear and car electronics. In my own case, they changed a motor that coughed and stumbled when I transmitted at 25 watts to one that ran smoothly even when I increased power to 100 watts. Four toroids were snapped onto the rig's DC cable (two at the transceiver and two at the battery), one on the speaker cable, one on the key cable, and one on the antenna's cable (right at the back of the rig). Follow that plan of toroid-choking every cable connected to the rig, then add an extra ground strap between the rig's case and car's frame, and most "stray RF" will be eliminated. Remaining problems usually can be minimized by shielding the car's computer and snapping more toroids on as many of its sensor and control cables as possible. Some of them are really "buried," so good hunting!

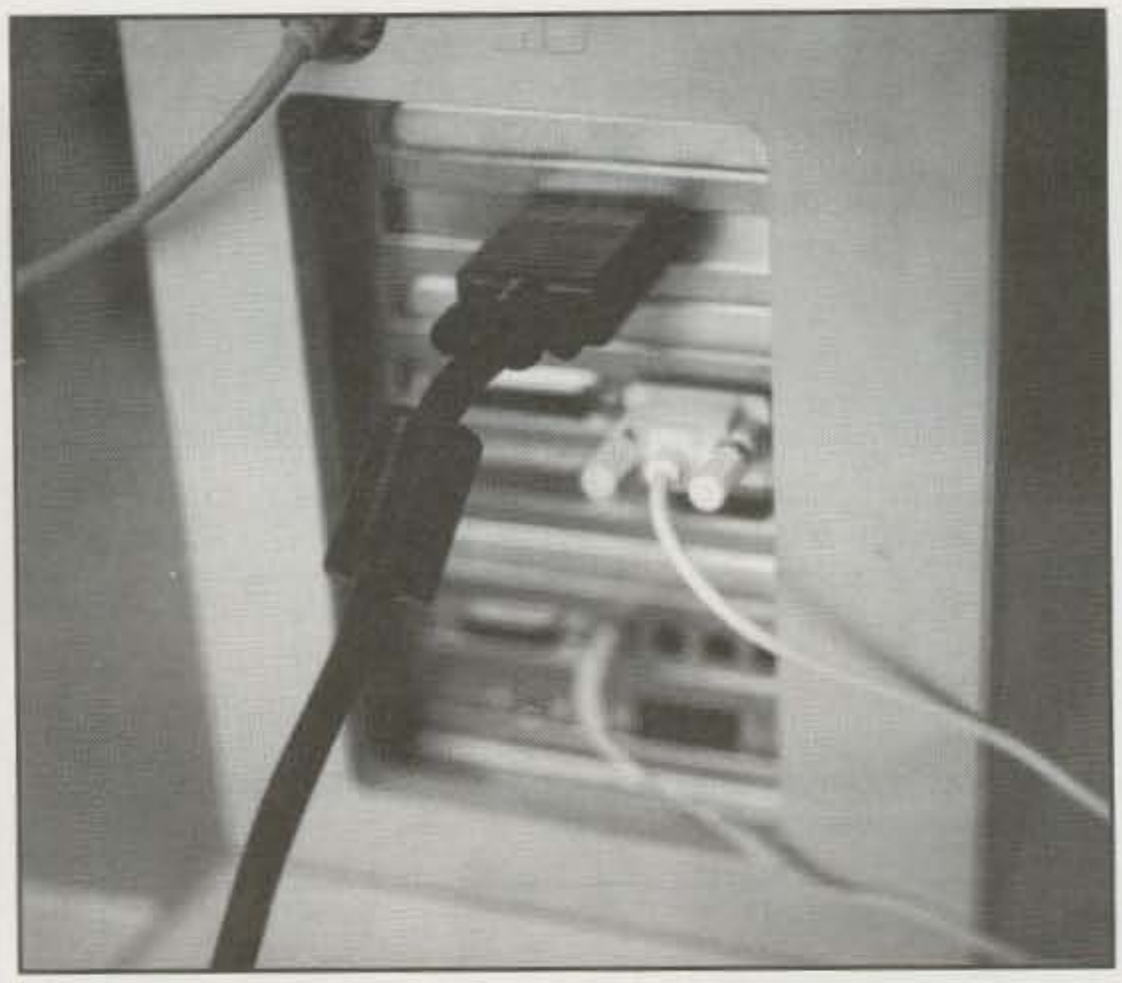


Photo 4– Long, round toroids such as the type installed on computer monitor cables work great for minimizing computer-generated "birdies" or "hash," and they also choke out amateur transmitted energy affecting computer items.

One final note on RF feedback (at home or in the car) bears mentioning. The Radio Works (Box 6159, Portsmouth, VA 23703) sells a coax line isolator (Model 4KRF-LI) that works great for minimizing feedline radiation and stray RF between a transceiver and amplifier or between a transceiver and mobile whip (photo 3). It also is terrific when used with fixed-station verticals. The 4KRF-LI comes with PL-259 connectors and installs in a flash. Give The Radio Works a call at 1-800-280-8327 to order one. You'll like it!

CRI

As one can surmise, interference between amateur rigs and home computers (and vice-versa!) can be a real bugaboo. An RF-subjected computer can "go bonkers" in a dozen different ways, and the amateur transceiver can be swamped with computer-generated "birdies" from 1 to 200 MHz. Want to know the best solution I have found? Move into a mobile/manufactured home. Yup, its metal siding is a total RF shield. You hear birdies galore until you connect the antenna's coax; then everything disappears and even RF feedback vanishes.

Once again, moving (raising!) your antenna and "toroiding" all cables leaving the computer's case are proven good cures. Scour hamfests and computer stores to find those large, long, round toroids such as the ones snapped tightly on monitor cables (photo 4). They have very high permeability and do a superb job of choking both RF and "birdies."

Double-check your computer's case for electrical "tightness" and RF/signal leakage. Did you know there are two types of computer cases? The generic type has few screws and mucho plastics; the deluxe type is metal and has more screws and tight fitting edges. Needless to say, deluxe is better!

Conclusion

We're once again completely out of space (so much to say, so little room). I will thus quickly wrap up with good wishes, and encourage you to keep having a ball on the air. Please remember to include an SASE when writing to me. Better yet, here's hoping we meet on 30 meters CW one weeknight or 20 meters SSB one Sunday afternoon soon. Watch for a super-combo holiday gifts and new areas column next month.

73, Dave, K4TWJ

OUR READERS SAY

W1FB—My Hero!

Editor, *CQ*:

Been reading your editorial of July '95. Your thoughts about Bob and Norm are right on target. I too would like to meet them.

Bringing the same theme into amateur radio, my hero is Doug DeMaw, W1FB. He has been my hero for over 25 years. I have three of his books and read every article I find with his name as author. I would like an autographed picture of Doug and his wife Jean, W1CKK. I have never met them.

I enjoy *CQ*, especially the technical articles.

Ira J. Morrison, WB4YQL
Harrison, AR

Propagation Handbook A Winner

Editor, *CQ*:

I have read several articles in your magazine. When I saw the ad you had for *The New Shortwave Propagation Handbook*, it caught my interest, so I purchased one at the local radio shop. To my surprise, I found out what fascinating reading it was. I have not finished it as yet, but I do believe you have a winner. Every shack should have one. I have not been a ham very long. I was 65 before I got my ticket—a late start.

Keep up the good work, and I hope to enjoy reading the rest of the book and *CQ*.

Ernest "Tex" Heintzelman, N7ULU
Phoenix, AZ

More of G4BXD's British Surplus

Editor, *CQ*:

I was thinking of letting my *CQ* subscription lapse after this year, since I am still not attuned to this solid-state, integrated circuit radio world that has now commandeered the pages of most amateur journals. Instead, I'm going to renew my subscription with *CQ*, because of the two British military surplus articles by Ben Nock, G4BXD, in your December '94, and June '95 issues. I was fascinated by both articles, and still reread them now and then. Being the superb writer he is, and with his use of those neat English terms, I hope to see more of his articles in the future. Surplus could once again be cheap fun, if only a magazine would educate Hamdom of its availability.

Mack Lester, KC5AQO
Lewisville, AR

Onward To The Second Fifty!

Editor, *CQ*:

I have been a subscriber for some time, and enjoy your articles by Bill Orr and others. I found the history review of your 50th anniversary insert quite interesting, as it covered one of the most enjoyable periods of my ham career. My original license, W9NZF, was issued in June 1933, and it's the callsign I still use today.

We are reviving the oldest continuously active radio club in the USA. It was founded in 1917 and ARRL affiliated in 1919. I am enclosing a copy of our renovated Newsletter, using our new laser printer as an adjunct to our desktop publishing effort.

I am writing to request a copy of your 50th Anniversary insert if you have any left. We would like to use it as a teaching aid in our radio school. We are a VEC and operate a teaching program for our younger enthusiasts. (Some of us old fogies like to put on history related instruction, aided by old ham gear as a demonstration!) We find the history programs valuable, and they are frequently the basis for our bulletin board displays.

As a result, our younger membership has increased, and they have decided that the club program has an interesting, balanced content. We feature some construction projects in which they can participate, and our Field Day participation has doubled.

Thank you, and keep up the good work in your second–50-year publication!

Fred A. Linn, W9NZF
Milwaukee, WI

RF Review Corrections

In the review of the RF Applications P-1500 Power SWR Bridge in the October issue, there are several inaccuracies.

1. In the first paragraph on page 50 it is written that the P-1500 "serves as a constant bar-graph monitor of your transmitter and antenna system." Not only are the values displayed on the bar-graph, but a digital display/readout is given as well.

2. In the second paragraph on page 50 it states that the 12 volt DC supply is provided. This is incorrect. A power cord is provided; the power supply is an available option.

3. RF Applications' address is *9310* Little Mountain Road, in *Kirtland* Hills, OH 44060.

AWARDS

BY NORM VAN RAAY, WA3RTY

NEWS OF CERTIFICATE AND AWARD COLLECTING

This month we salute an old timer from the "Show Me" state, Missouri:

Wilbur "Bill" Lewis, KØOJG USA-CA #673, August 1990

Bill's adventures in amateur radio began when he was nine years old and his mother gave him a crystal, some wire, and pair of headphones to keep him out of trouble. He lived in Enid, Oklahoma then. The world of radio was to keep Bill out of trouble for many years. From that little homebrew crystal set he heard sounds from all over the world. He was hooked. He then discovered a local radio club, attended meetings, and learned the code and the basics of electronics.

With the coming of World War II, Bill had to put his obsession aside while he served Uncle Sam in the National Guard, first in the 45th division and then in the 1st Field Artillery at Fort Sill, Oklahoma. He was discharged at the end of the war in 1945.

Finally, in 1959 Bill fulfilled his ambition and received his Novice and then General Class FCC license. During the early 1970s his employment as a refrigeration repairman for 59 Missouri counties gave him the opportunity to give out many of those Missouri counties. Then came the discovery of the County Hunters Net at 14.336. Karl Adkins, WA6MAR, introduced him to the county hunters, and Bill began the long road to the "whole ball of wax."

As with all of our award recipients, Bill hasn't forgotten those who helped him along the way. In particular, Bill wishes to acknowledge Dave Vig, N7BKW; Bill Nash, WØOWY; Ken Wilson, KB7QO; Joyce Boothe, WB9NUL; Jack True, WA9QNI; and especially Guy Bourgie, VE2YM, who gave him the very last county, Stevens, Kansas.

We salute Bill Lewis, KØOJG, USA-CA #673, for his achievement.

Awards Issued

USA-CA 500: Ed Aho, NR7F, #2869; Roger Purdy, WB2HUV, #2870; Joseph Walters, K8VSH, #2871; John H. Shannon, K3WWP, #2872; Antonio Galiana Cubi, EA5BY, #2873; R. H. Bob Browning, VE3EEM, #2874; Steve Southers, NH6SR, #2875; Edwood F. Bunch, N4UJK, #2876; Lars Lindahl, SM3KOR, #2877; Mike Prevatte, KN4XP, #2878; Kenneth Magee, WV1Y, #2879; David E. Schaal, KO6MB, #2880; Richard Kaplan, WB2CUT, #2881; William E. Mundis, KA3SPV, #2882.

USA-CA 1000: Ed Aho, NR7F, #1380: Roger Purdy, WB2HUV, #1381; John H. Shannon, K3WWP, #1382; R. H. Bob Browning, VE3EEM, #1383; Steve Southers, NH6SR, #1384; Edwood F. Bunch, N4UJK, #1385; Mike Prevatte, KN4XP, #1386; Kenneth Magee, WV1Y, #1387; Fred E. Leninson, KF9YL, #1388.

USA-CA 1500: Ida Voss, N2TPH, #1153; Ed Aho, NR7F, #1154; John H. Shannon, K3WWP, #1155; R. H. Bob Browning, VE3EEM, #1156; Steve Southers, NH6SR, #1157; Edwood F. Bunch, N4UJK, #1158; Mike Prevatte, KN4XP, #1159; Kenneth Magee, WV1Y, #1160.

USA-CA 2000: Ida Voss, N2TPH, #1059; Ed Aho, NR7F, #1060; R. H. Bob Browning, VE3EEM, #1061; Steve Southers, NH6SR, #1062; Edwood F. Bunch, N4UJK, #1063; Mike Prevatte, KN4XP, #1064; Kenneth Magee, WV1Y, #1065.

USA-CA 2500: Ronald D. Sweeney, N8HKJ, #982; Ida Voss, N2TPH, #983; Ed Aho, NR7F, #984; R. H. Bob Browning, VE3EEM, #985; Steve Southers, NH6SR, #986; Edwood F. Bunch, N4UJK, #987; Mike Prevatte, KN4XP, #988; Kenneth Magee, WV1Y, #989.

USA-CA 3000: Ida Voss, N2TPH, #894; Ed Aho, NR7F, #895; R. H. Bob Browning, VE3EEM, #896; Steve Southers, NH6SR, #897; Edwood F. Bunch, N4UJK, #898; Mike Prevatte, KN4XP, #899; Kenneth Magee, WV1Y, #900.

Box 76, Pleasant Mount, PA 18453-0076

SPECIAL HONOR ROLL

Ida Voss, N2TPH
USA-CA #874, 7-31-95

Edward H. Aho, NR7F
USA-CA #875, 7-31-95

R. H. Bob Browning, VE3EEM
USA-CA #876, 8-5-95

Steve Southers, NH6SR
USA-CA #877, 8-20-95

Edwood F. Bunch, N4UJK
USA-CA #878, 8-20-95

Mike Prevatte, KN4XP
USA-CA #879, 8-20-95

Kenneth F. Magee, WV1Y
USA-CA #880, 8-20-95

Barry C. Dutcher, KA1CLV
USA-CA #881, 9-1-95

HONOR ROLL

500		1000		1500		2000		2500		3000	
NR7F	2869	NR7F	1380	N2TPH	1153	N2TPH	1059	N8HJK	982	N2TPH	894
WB2HUV	2870	WB2HUV	1381	NR7F	1154	NR7F	1060	N2TPH	983	NR7F	895
K8VSH	2871	K3WWP	1382	K3WWP	1155	VE3EEM	1161	NR7F	984	VE3EEM	896
K3WWP	2872	VE3EEM	1383	VE3EEM	1156	tNH6SR	1162	VE3EEM	985	NH6SR	897
EA5BY	2873	NH6SR	1384	NH6SR	1157	N4UJK	1163	4X4RE	986	N4UJK	898
VE3EEM	2874	N4UJK	1385	N4UJK	1158	KN4XP	1164	NH6SR	987	KN4XP	899
NH6SR	2875	KN4XP	1386	KN4XP	1159	WV1Y	1165	N4UJK	988	WV1Y	900
N4UJK	2876	WV1Y	1387	WV1Y	1160			KN4XP	989		
SM3KOR	2877	KF9YL	1388					WV1Y	990		
KN4XP	2878										
WV1Y	2879										
KO6MB	2880										
WB2CUT	2881										
KA3SPV	2882										

The total number of counties for credit for the United States of America Counties Award is 3076. The basic award fee for subscribers is $4.00. For nonsubscribers it is $10.00. Initial application must be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 76 North Broadway, Hicksville, NY 11801 USA for $2.00. To qualify for the special subscriber rate, please send a recent *CQ* mailing label with your application. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 15, 1991. A complete copy of the rules may be obtained by sending an SASE to Norm Van Raay, WA3RTY, USA-CA Award Manager, Box 76, Pleasant Mount, PA 18453-0076 USA. DX stations must include extra postage for airmail reply.

Daughter of Marconi Honored

A representative of the Marconi Amateur Wireless Society of Sydney, Nova Scotia had the great honor of making a public presentation to Princess Elettra Marconi Giovanelli, daughter of Guglielmo Marconi. In June 1995 Princess Elettra was in Nova Scotia as part of the worldwide celebration of the centennary of radio. Her father made history from Glace Bay, Nova Scotia on December 15, 1902, when he transmitted the first wireless message across the Atlantic Ocean from west to east.

During a public reception for the Princess in Sydney, Jack Colombus, VE1XT, and Alan Leith, VE1AL, present-

Princess Elettra, daughter of Guglielmo Marconi, is shown here receiving a copy of a certificate the Marconi Amateur Wireless Society of Sydney, Nova Scotia, makes available to amateurs who contact special-event station VA1S when it is operational every December. Jack Colombus, VE1XT (second from the left), and Alan Leith, VE1AL (left), made the presentation n June. On the right is Princess Elettra's son, Prince Guglielmo.

ed Marconi's youngest daughter with a copy of a certificate the Marconi Amateur Wireless Society makes available to amateurs who contact special-event station VA1S when it is operational every December. Princess Elettra expressed great delight in receiving the certificate and accompanying QSL cards, and wished the society good luck in their efforts to publicize the special historical connection between Nova Scotia and her father.

On A Personal Note

Sorry about the column last month. As some of you know, I had a problem with low blood pressure and spent a week at the Veterans' Administration Hospital while they adjusted my medication. They're great folks at the VAMC Wilkes Barre, and I'm very grateful to them.

We enjoyed ourselves at the annual Mobile Amateur Radio Awards Club (MARAC) in Hamburg, New York. There were plenty of activities for everyone—shopping at the local malls, visiting Niagara Falls, golfing, and just plain eyeball QSOing. Joyce, WB9NUL, was the hostess with the mostest in the hospitality room and greeted all with a hug and a kiss.

The banquet was great (they even

The gang at the National MARAC Convention in Hamburg, New York, in July.

Here are the CW County Hunters at the MARAC Convention. Pictured (left to right) are K2NJ, KA1CLV, KA3MMM, KB1AF, KB4XK, W5AL, W1TEE, NO2W, VE3KZE, WA2CNJ, KM4ES, NFØX, K1ER, W3DYA, K4QFK, K8CW, W9MYY, AA2AV (convention chair), and N2CWG. (Photo via AA2AV)

accommodated this new vegetarian). Unfortunately, we didn't win any of the great door prizes. Gene Tyree, N4ANV, won the afghan donated by my YL, Carol. The annual group picture was taken just before the heavens opened up with a thunderstorm. We also had the opportunity to eyeball a few representatives of that intrepid group of April Fools who call themselves BOZOS (see April 1995 *CQ*). Their picture is included even though they begged me not to publish it. Some of them are on the FBI's Ten Most Wanted List.

We recently caught a movie from the satellite dish that should interest amateur radio enthusiasts. *High Frequency* is a very nice story about a 12-year-old unlicensed amateur in Maine and a licensed amateur way up in a satellite relay station in the Swiss Alps. Check it out; I'm sure you'll enjoy it. It is also suitable for children.

See you next month!

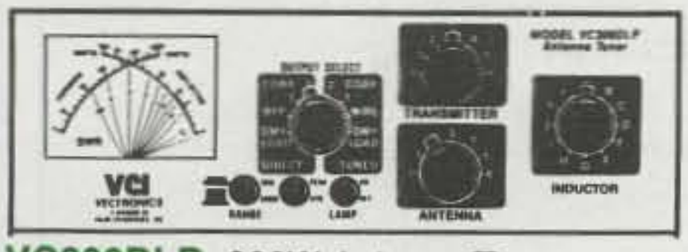
73, Norm, WA3RTY

A happy after-hours group at the MARAC Convention included (left to right) WB9OOG, WA3RTY, W9OP, W4OWY, AB5SL, WA2CNJ, VE9DH, and K2NJ.

VECTRONICS™

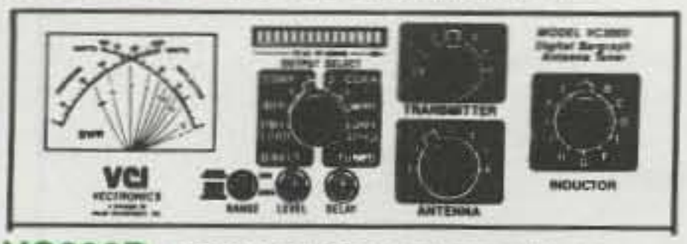
VC300M 300W Mobile Tuner

DL300M
300 Watt,
150 MHz, Dry
Dummy Load

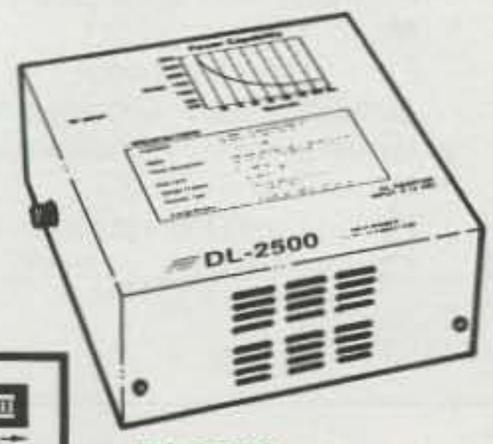


VC300DLP 300W Antenna Tuner

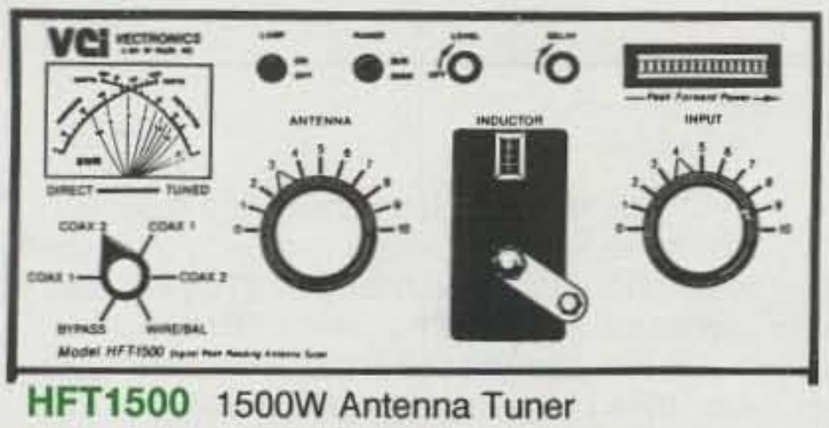
DL650M
1500 Watt,
650 MHz, Dry
Dummy Load



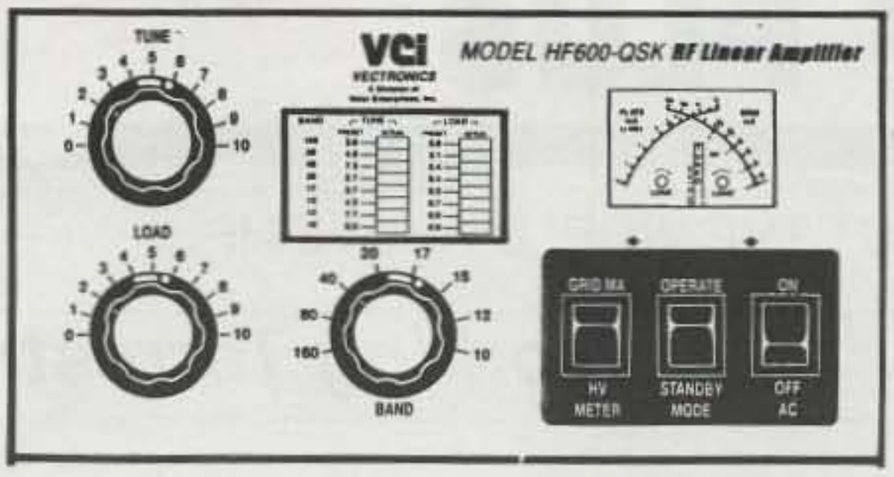
VC300D 300W Digital Antenna Tuner



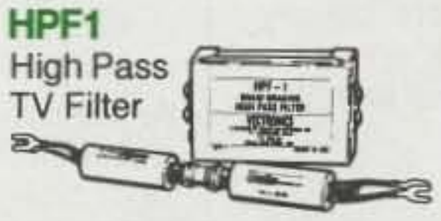
DL2500
2500 Watt, 150 MHz,
Dry Dummy Load



HFT1500 1500W Antenna Tuner



HF600QSK
1kW HF RF Linear
Amplifier with
built-in QSK.



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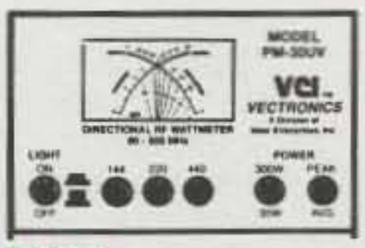
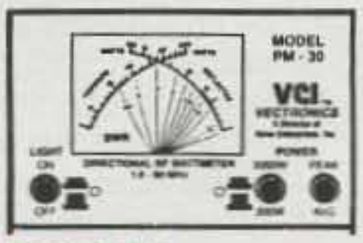
Mobile
Active
Antenna/
Tuner

LP30
1500W Low Pass TVI Filter
(Also available: **LP2500**;
2500W Low Pass TVI Filter)



PM30
300W/3kW Wattmeter

CK200 Deluxe CW Keyer



PM30UV
30W/300W Wattmeter

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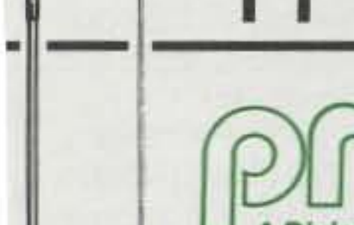

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receives in the range
of 100-1200 MHz.

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440-450 MHz.

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440-450 MHz.

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Mount Kit to cover
144-440 MHz.

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12" Dual
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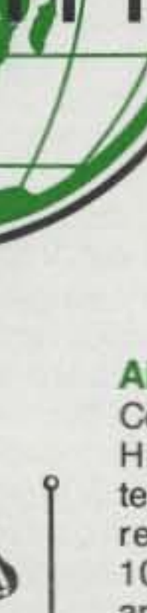
Duck"
covers
2 meter
and UHF.



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10, 15, 20, 40,
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3-3/4" Chrome Magnet
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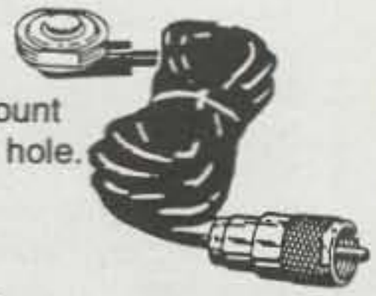
PAM2
3-1/4" Chrome Magnet
Mount Kit. (Black: **PAM2B**)

PAM4
5" Chrome Magnet Mount
Kit. (Black: **PAM4B**)

PAS
Surface Mount
Kit for 3/4" hole.



PAT2
Trunk Lip Mount
Kit. (Black: **PAT2B**)

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BY JOE LYNCH, N6CL

ALL ABOUT THE WORLD ABOVE HF

Working Terrestrial DX on 2 Meters

Terrestrial DX on 2 meters? Most of us don't think in terms of countries on 2 meters. Usually it's grid locators and states, and when we do think of countries, we think that they can only be worked via the moon.

In the following letter, Chris Patterson, who himself has put a few different countries on 2 meters, challenges us to take another look at the potential by telling us about his QSO with Ron Thompson, FP5EK, the work Ron had to go through to get on the band, and Chris's other experiences of working seven other different countries terrestrially.

"I thought I'd write a note to let you know that Ron Thompson, FP5EK, a resident of St. Pierre et Miquelon, GN16, is active in a limited fashion on 2 meters and is available for skeds. He was active during the *Perseids* shower, and getting him on the air is a story in itself.

"Because Ron is active on 6 meters from St. Pierre—a separate DXCC country within tropo, meteor scatter, sporadic-E, and aurora range of a lot of the northeastern US—I wrote to him in July to see if he would be able to get on during the *Perseids* meteor shower. He replied that he had no 2 meter meteor scatter experience, a FT-260 (10 watts) with no manual, no amplifier, and a 14-element satellite antenna.

"He also had severe space limitations and TVI problems which restricted operation from his home. He was receptive to the idea, however, so I went to work. Through Ron Klimas, WZ1V, I was able to find someone with an FT-260 manual. He graciously copied it and sent it to me.

"I also photocopied some old *QST* articles on meteor scatter procedures to send. I dug out an old 80 watt brick, and got that ready to go. I called Gerald Williamson, K5GW, who agreed to supply one of his 10-element EME design Yagis.

"To make sure Ron got everything in time, the equipment was sent to him in care of a friend's house in western Ontario, where he was going to spend a few days in late July. He got the boxes okay. He also arranged to use a cottage outside of town to avoid TVI problems.

"Early last week (early August), however, problems began to surface. Ron's son was injured in a bicycle accident and had to be medivaced from the island. Ron went with him, and faxed me that he didn't know when he would return. Fortunately, the injuries were not as bad as first thought, and Ron let me know he would be back for the weekend.

"Then, on Friday, August 11, when Ron unpacked the antenna, the elements were missing! Here in the states, getting 3/16 inch rod is no big deal; in St. Pierre it is almost impossible. Ron said he'd come up with something. I just hoped it would work. (He did borrow a 12-element Yagi, which worked well.)

"On Saturday, I awaited the sked time anxiously. I knew WZ1V had called Ron and set up a sked a couple of hours after mine, so even if we didn't work, he might be available on random. Ron and I spoke on 20 meters just before schedule time. He was still setting up, so we pushed things back an hour.

"When sked time arrived, the sked frequency sounded like 144.200 MHz! At least two other stations had made schedules using the same frequency. During the sked I heard many weak bursts, but couldn't identify who was who. I was really disappointed. I tried to get Ron on 20 meters to make a second sked, but couldn't raise him. All I could do was wait to tail-end WZ1V and hope Ron heard me.

"WZ1V started his sked at 16:00 UTC and it was obvious he was hearing more than I was. He completed about 17 minutes later, and cleared. I then began to call FP5EK. At 16:21 I heard him calling WZ1V. I broke in and he came back to me. We began a *three minute* QSO! Ron confirmed his QSO with WZ1V, and we exchanged other information.

"The burn seemed to be endless, so I suggested to Ron that he QSY to 144.22 MHz for random contacts. We ended the contact and I QSYed 144.200 MHz. Ron was still coming through! The burn was *four minutes long!* I put out a call and several people called Ron. Unfortunately, he didn't work anyone else during that burn.

"About five minutes later I heard Ron, VE9AA, and a VE1 station on another nice burst. The calling frequency QRM prevented any contacts, however. I found out later that Ron made three more scatter contacts, including VE1KG, W5UN/VE1, and WA2GSX. Had people looked northeast toward St. Pierre during the shower, I'm sure Ron could have made several more contacts.

"I do hope Ron can get set up at home so he will be available on a regular basis. For those who are interested in schedules, his phone number is 011-508-4131-93. Local time on St. Pierre is two hours ahead of the eastern time zone, and Ron asked that people please remember that when they call. (Ten PM east coast time is midnight at Ron's QTH.)

"By the way, most 2 meter operators don't even think of working different countries on that band. That's a mistake. I've worked eight countries on non-EME modes. They include Bermuda, VP9 (meteors, tropo); Bahamas, C6A (tropo, meteors); Cuba, CO (sporadic-E); Turks & Caicos, VP5 (meteors); Canada, VE, (tropo, meteors, aurora); United Nations, 4U1 (tropo); United States, W, K (tropo, meteors, etc.); and St. Pierre et Miquelon, FP5 (meteors).

"Also workable from here are St. Paul Island, CY9 (FN97); Sable Island, CYØ (FN93); Guantanomo Bay, KG4 (FK29); and with some extended single-hop sporadic-E, Jamaica, 6Y5 (FK17); Dominican Republic, HI (FK49); Mexico, XE (EL51); and Haiti, HH (FK39). All of these locations are under 1500 miles from FN10. Stations a couple of hundred miles south of here can do even better in the Caribbean.

"Not all of these locations are currently active on 2 meter terrestrial modes, but a number have operators active on satellites or 6 meters who could get active with encouragement. Additionally, several of the Caribbean locations have resorts which provide a nice place for contest expeditions.

"I hope my experiences and this letter encourage others to look for new countries on 2 meters. 73 de Chris Patterson, 717-569-3828 (h), 717-299-7374 (w), 717-291-0998 (fax)."

So what about it? We recently have seen that almost all of the west coast can work Hawaii on 2 meters. Depending on where you are on the west coast, it is theoretically possible to work Alaska, and, of course Canada and Mexico. If you live in the central part of the US, Canada, or Mexico, both are possible. The farther south you are in the central US the closer you are to countries in Central America beyond Mexico. Additionally, countries in the Caribbean start getting within range.

How do you know what you can work from your QTH? Find your location and draw a cou-

VHF PLUS CALENDAR

November 4–5	Second weekend of the ARRL EME contest. *(See text for details.)*
November 5	Good EME conditions. *Taurids* meteor shower predicted peak.
November 7	Full moon.
November 10	Highest moon declination.
November 11	Moon Apogee
November 12	Poor EME conditions.
November 18	*Leonids* meteor shower predicted peak approximately 0700 UTC.
November 19	Moderate EME conditions.
November 22	New moon.
November 24	Perigee and lowest moon declination.
November 26	Moderate EME conditions.

EME conditions courtesy W5LUU.

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ple of circles around it. The first circle will be at the 450 mile range. This is probably your tropo limit, although tropo contacts have been made as far as 1200+ miles away.

The next circle should be at the 1350 mile range. This is probably your sporadic-E/meteor-scatter limit. Now you see what countries fall within your limits. However, tropo-assisted contacts can go farther. Nevertheless, you should concentrate your efforts on working what you confidentially know is within your range.

The next step is to determine the feasibility of working someone in that country. As you read above from Chris's letter, to get Ron on the air Chris had to make an investment. This investment may not be possible for you alone. However, if you and your fellow neighbors pooled your resources and made a few well-placed calls (to K5GW for an antenna, perhaps), you never know what might transpire.

The additional spinoff benefit of helping another amateur get on the air is amateur radio diplomacy—that is, the furtherance of different aspects of our hobby into areas of the world. This in turn promotes growth and goodwill, and that is what we are all about, anyway.

Incidentally, regarding Ron, I received the following e-mail from Serge, VE1KG: "Ron, FP5EK, on the island of St. Pierre et Miquelon is interested in microwave communications as well as EME 1296 MHz and above. He has access to some equipment on the island. He has a 6 foot dish; he is looking for elevation read-out design as well as azimuth read-out. Also any magazine dealing with all the above! Following is Ron's address: Ron Thompson, c/o Air St. Pierre, 1 Bell Boulevard, Halifax International Airport, Enfield, B2T 1K2, Nova Scotia, Canada, (Fax 011 (508) 41-40-25). 73 de Serge, VE1KG, E-mail: clrowe@ac.dal.ca."

New ARRL Scoring Rules For VHF Rovers Announced

The following is a press release from the ARRL: "The ARRL Contest Advisory Committee (CAC) voted 11 to 4 to recommend new scoring rules for Rovers in ARRL VHF/UHF contests. The CAC considered the results of a recent poll of Rovers and other VHF contest participants in preparing their recommendation. Objectives of the proposal include: simple to calculate, fair to all, progressive scoring over the course of the contest, and discouraging grid circling.

"The ARRL Awards Committee voted unanimously to accept the CAC recommendation, which has been dubbed as U+A scoring.

"The new scoring rules call for Rovers (only) to multiply total QSO points from all grids by the sum of unique band-grids worked and of activated grids. (A unique band-grid is a grid square worked on one band from any grid square; in other words, if you work EM00 on 50 MHz from one grid, you may not count EM00 on 50 MHz again for multiplier credit. Each grid worked counts only once per band, just as in the fixed-location categories.)

"The new rules become effective with the January 1996 VHF Sweep Stakes. Rovers will continue to be included in the Club Aggregate Competition scores, as they have in the past.

"The CAC and the Contest Desk have agreed to revisit the results of this rules change in two years. If experience indicates, further amendments will be considered at that time. For further information, contact Billy Lunt, KR1R, at League Headquarters."

May Martin, VP2MN, SK

May Martin, VP2MN, wife of Bobby Martin, VP2MO, was killed in an automobile accident in late August. Bobby and May were returning to their home to get some of their possessions after having been evacuated from it earlier. Details of the evacuation are sketchy as of this writing.

I knew May, having met her, Bobby, and their children when I was in Montserrat in September 1991. I was there with a work team from my church, repairing a church that had been damaged the year before by Hurricane Hugo. Bobby and May graciously entertained me in their home on the next to the last day I was in country. Upon hearing the news, I was deeply saddened for having lost a wonderful DX friend and also for Bobby and his family for their tremendous loss.

Many of us have worked Bobby on 6 meters, so we know him quite well. We can all send our sympathy to him by dropping him a QSL or a note expressing our condolences via his *Callbook* address. I'm sure he will appreciate it.

Current Meteor Showers

Two minor meteor showers, the *Taurids* and the *Leonids*, will peak this month. The *Taurids* is scheduled to peak on 5 November and the *Leonids* is scheduled to peak somewhere between 0400 and 1000 UTC on 18 November. Peak activity is not much above sporadic levels at 10 to 15 meteors per hour for either one of these showers. For the *Leonids*, however, next year may be the beginning of the 33 year return of its peak. Many astronomers are predicting a storm for either 1998 or 1999. More details will be forthcoming.

Current Contests

The second weekend of the ARRL EME Test is scheduled for 4–5 November. Complete rules are in the September issue of *QST*.

EME Contest DXpeditions

The VE3ONT schedule for the EME contest is as follows (all times are UTC): 432 MHz, November 3/4 0000–0805, transmit 432.050 MHz, listen 432.050–432.060 MHz; and 144 MHz, November 4/5, 2135–0910, November 5 2205–2400 transmit, 144.100 MHz, receive, 144.100–144.110 MHz.

The following is from the "432+ EME Newsletter."

"**CN2EME, Morocco 95:** After having organized several successful EME expeditions (1989 4U1TU in Geneva, 1991 T7ØA in San Marino and 1992 CS1EME in Portugal), the Yota Sawe EME Group is on the road again. The next expedition will lead them to Africa, as they have decided to be active from Morocco.

"In order to reach the greatest number of stations, their operation will be centered on the 1995 international ARRL EME competition (4 & 5 Nov.). Operation should start on 3 Nov. and stop on 6 Nov. The callsign they asked for is CN2EME, but this callsign has not yet been confirmed.

"Equipment will be 8 x 11 .5 el Yagis open-wire fed on a self-supporting tripod; TS85OS converter 28-432, 4CX250R driver and TH327 coaxial cavity PA; 2-stage preamp and low-noise high dynamic range 432-28 converter (.32 dB total NF), TS850S and digital signal processor; HB automatic AZ-El moon tracking interface with 80386DX33 computer and associated software.

"From the experience gained in previous expeditions they know they can work small stations (2 Yagis and 1 KW or 4 Yagis and 500 W). So stations with no elevation should call on their moonrise or moonset. The team's core is still the same with F5JBP and F6HYE. And this time their friend F6IRF will join the team. QSLs will again be managed by F6BGC.

"The exact position of the station is not known, but should be very close to Rabat. The frequency to used will be around 432.023 MHz, depending on possible local interference. Contact F6HYE at Patrick Magnin, Marcorens, 74140 Ballaison, France, tel ++(33) 50 94 19 14, E-mail magnin@sc2a.unige.ch, AX25 f6hye@hb9iap, or their QSL Manager F6BGC at Noel Chenavard, 74160 Bossey, France.

A New Solar Cycle?

The following two articles are printed here courtesy VE7HCE and the "50 MHz DX Bulletin." They should be encouraging news to the 6 meter DX enthusiasts who worship the highly-spotted sun.

"Sky & Telescope News Bulletin September 2, 1995—Caltech Observatory Sees Start of New Solar Sunspot Cycle: Pasadena—The first sunspot in the new sunspot cycle was identified on Saturday, August 12, by astronomers at the California Institute of Technology's Big Bear Solar Observatory in Big Bear City, California. The new sunspot marks the end of the sun's quiescent period and the beginning of a new surge of sunspot activity."

From VE7HCE via the Internet: "Observations suggest that a new solar cycle, number 23, has begun, even though the turnaround at solar minimum was not expected until sometime next year. Caltech's Big Bear Observatory reports two active regions on the Sun with the magnetic polarity expected for the new cycle. In some ways an accelerated schedule might have been foreseen. According to solar expert Cary Oler, cycle 22 took only 34 months to rise from minimum to maximum, so an early minimum thereafter would not be a huge surprise. Oler says we might now expect the next solar maximum to occur in late 1998 or early 1999, rather sometime in the year 2000.

"There is typically some overlap between successive sunspot cycles. As the last sunspots of one cycle appear near the equator, at latitudes of about 7 degress, the next cycle starts again with sunspots near 30 degress, but with the magnetic polarity of the new spots reversed.

"That's exactly the point the sun is at now; it has been in a quiescent period through much of 1994 and this year, with a few spots showing up near the equator. The new sunspot photographed on Saturday appeared at a solar latitude of 21 degress, and its magnetic polarity is opposite to that seen over the last decade, a key to identifying it as the manifestation of the start of a new cycle.

"This new sunspot appeared a bit earlier than astronomers expected. Typically, as a solar cycle winds down, late bursts of sunspot activity will appear near the equator before the new cycle starts. Scientists had seen these late pulses of sunspots in 1984, but saw little late activity this time and therefore expected an early beginning to the new cycle, but not this early."

From "50 MHz DX Bulletin": **Has the Solar Cycle Bottomed Out?** I don't know how much stock to take in this item, which appeared in the "Science & Medicine Section" of the August 29 edition of the *San Jose Mercury News*.

"At any rate, Janet Rae-Dupree, *Mercury News* Staff Writer, wrote that scientists captured images of the first of a new series of sunspots on August 12, and have observed half a dozen more since then.

"Early in the solar cycle spots tend to occur in the vicinity of ±40 degrees of solar latitude, while near the end of the solar cycle they tend to occur closer to the equator, say ±5 degrees. Spots of the old and new cycle may coexist. Frequently spots occur in close pairs aligned parallel to the equator, with the two spots hav-

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ing opposite (magnetic) polarities. The general field of the sun reverses polarity between cycles and the leading spots will have the opposite polarity from those of the preceding solar cycle. Scientists can detect these fields by measuring optical spectral splitting caused by the Zeeman Effect due to the large magnetic field in the vicinity of a sunspot which may be as high as 4000 gauss.

"Rae-Dupree quotes Ben Damsky of the Electric Power Research Institute as saying, '. . . But when the cycle peaks in the next few years, solar disturbances can cause serious problems.'

"Hal Zirin, professor of astrophysics at the California Institute of Technology and director of the University's solar observatory at Big Bear Lake, which recorded the first new spots, is quoted as saying, 'They're popping up every which way, and not where we expected to [be].'

"The first pair of new-cycle spots Zirin's colleagues photographed was at 21 degrees latitude, closer to the equator than they expected. A few days later a pair of old-cycle spots rolled into view. Then a new-cycle pair showed at 38 degrees latitude. And then, on August 24, another new-cycle pair showed up just 7 degrees above the sun's equator—a location far more common late in a cycle's life. And then, delighting scientists, those spots erupted into the cycle's first solar flare.

"Zirin said that it's difficult to predict when the new solar cycle will peak, but he guesses the cycle's major disturbances will occur between 1997 and 1999.

"I don't remember just how much time occurs between the first appearance of new cycle spots and the bottom of the solar cycle, but here you have a couple of authorities saying that the peak of the next cycle is due in the next few years."

So what can we expect in the next cycle? Peter Taylor, in his book *Observing the Sun*, examines recent cycles and compares the even-numbered cycles with the odd-numbered cycles. He concludes that the even-numbered cycles have longer extended maxima than the odd-numbered cycles. However, he also points out that the recent odd-numbered cycles are higher than their counterpart even-numbered cycles. Finally, he notes that " . . . if the odd-even relationship continues, the maximum of cycle 23 should also be a very strong one, perhaps with a peak strength which approaches 200 (in mean sunspot numbers)."

In 1976 as part of my research for my digest article on the Maunder Minimum (which appeared in July 1976 *QST*), I spoke with Dr. John Eddy, who had prepared a paper on it (the basis of my article) for *Nature* magazine. During the course of our conversation, Dr. Eddy speculated that we were on a long-term cycle of ever-increasing solar cycles, with the peak of such a cycle occurring sometime late in the 21st century. While both Drs. Taylor and Eddy agree on increasing numbers for the next cycle, it's still a "pay your money and take your chances" situation. Nevertheless, as former *CQ* magazine DX columnist Hugh Cassidy, WA6AUD, used to say, "There is always hope for the faithful."

New 222 MHz Award

The following information is courtesy the "West Coast VHFer." The Hudson Watershed VHF Society will sponsor two awards related to 222 MHz EME activity during this year's ARRL EME contest. The first will be issued for the highest score on 222 MHz in the contest. The award, an engraved plaque, will be based on the highest *published* score in *QST*. It will be shipped to the *Callbook* address of the station so listed in *QST* when the contest results are published. There is no need to apply for the award.

A second plaque will be awarded to the station who submits a copy of their logsheet indicating the earliest 222 MHz EME contact during the contest period. Your log must show the following: date, time, callsigns, and report. Also requested is information on your station.

Entry deadline is 30 days after the last day of the contest period. Mail it to: Joe Bruno, WB2VVS, 45 Munson Rd., Pleasantville, NY 10570.

Results of VE3ONT 10 GHz EME Operation

The following is from Dennis Mungham, VE3ASO, and is courtesy the Internet: "Here is a brief account of VE3ONT activities on Aug. 18–20. Friday setup went fairly well but took much longer than anticipated. There was no time to check sun noise. Telescope tracking of the moon was erratic and unreliable on Aug. 19. Coupled with receive problems, no contacts were made and no mapping experiments were carried out on Aug. 19. During the day, Aug. 19, changes were made to the receive system and preamps substituted to give about 14 dB of sun noise. At moon rise on Aug. 20 echoes were encouraging, but we still had to track the moon manually with the telescope.

"The following stations were worked on Sunday, Aug. 20: DJ7FJ, OH2AXH, DLØSHF, WB5LUA, WA7CJO, PA3CSG, SM4DHN, F6KSX, WA5VJB, OK1KIR, GM4ISM, G4KGC, GM4ZKE, and VE7CLD.

"We never achieved enough signal-to-noise ratio to effectively conduct the mapping experiments. Overall, our own echoes and signals received were below expected values. We are not sure why this was so, but will be investigating all possible reasons."

ARRL Files Comments Opposing 5 GHz Petition

The following is from ARRL Bulletin 69: "The ARRL has filed comments on a petition for rule making that would allocate 300 MHz of spectrum in the 5 GHz band. The petition, filed by Apple Computer, Inc., seeks 150 MHz at 5150–5300 MHz and 5725–5875 MHz. Amateurs currently have access to the entire range of 5650–5925 MHz on a shared basis.

"The Apple petition, RM 8653, seeks the spectrum for a new, unlicensed radio service that the League called 'essentially unregulated,' save that proposes the use of directional antennas and relatively high power, and protected allocation status in shared bands by 'non-technical persons.' In defense of the Amateur Radio allocation in the 5 GHz band, the ARRL cited activity in a number of metropolitan areas around the U.S.

"The League said the petition doesn't show why 300 MHz is necessary for such a service; why existing wireless and wireline services aren't sufficient; and why a proceeding such as this should not wait until current proposals on such services are resolved. The ARRL also said the petition fails to consider compatibility between the proposed radio service and other services."

And Finally . . .

One of the facets I am dealing with in graduate school is the comparison (and sometimes contrast) between reading about something and actually experiencing it. This correlation caused me to reflect on so many of the different activities available to the VHF+ operator.

For example, it never ceases to amaze me how a signal can travel all the way to the moon and back again. Yet the other night, after I enjoyed a wonderful dinner with Al Ward, WB5LUA, and his family, he demonstrated to me the operation of his 10 GHz EME setup. Once again, I was hearing signals being bounced off the moon. How it is possible for a signal to travel over 250,000 miles into space and back again is beyond my comprehension. Yet after each transmission, and the 2.5 second delay, there they were.

One other thing I reflected upon was how often people said it was impossible to do something, only to have that so-called "impossibility" proven wrong. It was back in 1934 that VHF operators thought that it wasn't possible for someone to transmit signals beyond the line of sight. However, Ross Hull, an Australian amateur who was working for the ARRL at the time, conducted beyond the line of sight experiments that were successful. These experiments eventually led to more and more long-distance attempts (some of them ridiculously implausible according to today's standards). Curiosity aroused by these early experiments led to the first transatlantic QSO on 6 meters, when Ed Tilton, W1HDQ, worked G6DH, on November 24, 1946, 49 years ago this month.

The VHF+ operator can operate using sporadic-E, meteor scatter, tropo, aurora, and, as mentioned above, bouncing signals off the moon. Additionally, during peak sunspot activity the 6 meter operator can make long-distance DX contacts using *F2* propagation (the mode used by Ed for his transatlantic QSO mentioned above).

If you have come across this column because of the word "VHF" in its title, perhaps you should seriously consider what options are available to you, a potentially new weak-signal operator. You might find that someday you are the one who proves the false prophets of the VHF+ bands wrong again.

If you want to report on one of your experiences, please drop me a note via the address on the first page of this column. You may also e-mail me at a new Internet address:

jlynch@post.cis.smu.edu.

The old CompuServe address is still good (72124.2734@compuserve.com), but now that I am in school it is checked less often. The same goes for my voice and fax phone numbers (405-528-6625 and 405-528-0746, respectively), which also are still good but are checked less often. You can, however, get through to me. I will be interest in hearing from you. Until next month . . .

73, Joe, N6CL

PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

BY BUCK ROGERS, K4ABT

Windows 95™

Where else did you expect me to begin this month's column? Here is a topic that is on every 386, 486, and Pentium owner's mind. I, for one, am having a ball with Microsoft© Windows 95™. My MULTICOM™ and BUXTERM© run flawlessly under Windows 95. Even WORD 7.0 for Windows 95 is easier and more feature filled.

I watched, amazed, eyes glazed, as the video displayed in 16 million colors on the CRT and music played in stereo from the speakers attached to my Pentium 100. Wow, what a rush! Now I truly feel that we have to put on the "work gloves" and get to work.

Speed—yes, speed! That's where it's at. Packet radio and the medium that we use has to—must!—move to a new level. It would seem that our digital world is moving by as if *we* were moving in reverse.

The Future

Without another glance at the past, let's consider where the future is about to take us. I see change even greater than what we have already experienced. For a moment, however, let's concern ourselves with our hobby of packet radio. As we stand today, we don't have much to challenge us. But what if—and that's a big *what if*—we had a packet system that would handle not 1200 or 9600 baud, but data speeds of 19,200 baud and above. The ideal speed would be 38,400 baud, or better yet, given a 100 kHz bandwidth, we could easily break the 64,000 baud barrier.

Let's step back to the 19,200 baud. Already we have a couple of TNC manufacturers who have crossed that hurdle. Even a couple of low-power, data-ready radios are available which have the bandwidth to pass 19.2 Kb. But alas, they are crystal controlled. Moreover, they have low power output (10 watts or less), which limits the range and effectiveness of such a dream system.

Where is this topic headed? Well, let me give you some idea by opening that dreaded little box and using the "I" word in the same breath. Consider a "star-gate" access from packet radio into the online Internet services. Now you see where this QSO is headed!

Surf 'n

Somewhere there has to be a happy medium where we can have our cake and eat it, too. As much as I like packet, I do occasionally enjoy a short ride on the Internet waves. (I've now used the "I" word twice and lightning never struck). Surfing the Internet is fun, but the novelty soon wears off and I'm back to my packet stations.

Now some would think that I'm crossing two purebreds that could eventually parent a monster, when in truth the payoff that could be derived from the crossing of the Internet and packet radio could very well be the next generation of amateur radio communications.

The Internet offers more than just access to information from any part of the world. I hope that some readers of this month's column are transceiver and packet-controller OEMs, because I full well plan to express the notions of many digital radio users in this column.

We have the TNCs and KPCs needed to take the plunge, but we still lack the kind of transceiver that we were discussing earlier. This is where I hope our words are being heard and are not falling on deaf ears.

If the transceiver manufacturers are paying attention—I mean *all* of them—they soon will realize that their next challenge is to fulfill the void that now exists. Build it plug and play, and build it priced to sell to a mass market. True, the initial costs will be the engineering, but the payoff will be outstanding. The first OEM to deliver a UHF-synthesized, wide-channel-width (50 kHz or better) transceiver in the 25 to 50 watt class and price it at under $500 will reap the windfall. Remember, the magic word is "under." OEMs, we're ready. Are you?

The rest of this clever undertaking lies in the ingenuity of the digital operator. It will require one of the present-day telephone modems (14,400 baud units sell for $69.95) backed up to, let's say, a Kantronics KPC-9612 packet controller with its parameters set for 19,200 ABAUD, and the *same* for HBAUD (HDLC). The interface cable between the two will require a null-modem cable to complete the loop (see fig. 1). Set the CONMODE command to TRANSPARENT and be sure the telephone modem does not echo characters.

Set the ATDT string as needed for the local access and prepare the interface cable between the packet controller and the high-speed data radio. Whoops, I almost forgot: We don't have one of those yet.

Why do we have to settle for a 9.6 Kb capable radio? For now, we have the 10 watt D4-10 Kantronics crystal-controlled radio that is good for line-of-site. If this is a starting place, then by all means, let's go for it.

I somehow feel that the transceiver makers are trying to provide for the new "tech" amateur radio operator. That's super, but somehow they failed to notice where the new class of amateur operator is migrating. Nearly 70% of them are making plans to become active on VHF or UHF packet. Their *next* purchase is a transceiver; their *first* is a packet controller.

211 Luenburg Drive, Evington, VA 24550

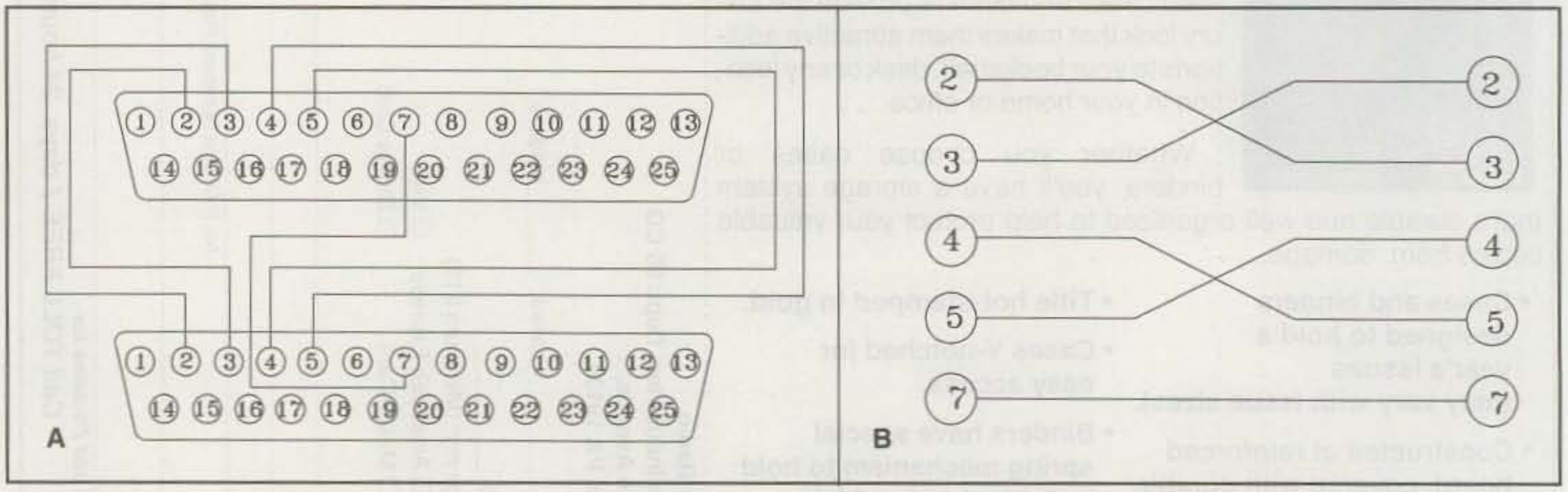

Fig. 1– The interface cable shown here is called a "null-modem" cable and is often used when interfacing a packet controller to a conventional telephone modem. (A) is the pictorial and (B) is the schematic. Comport speed of both the TNC and modem should be set the same (19,200 baud) to enable communications between both units. HDLC and line connecting speeds are set accordingly (see text).

The Kantronics D4-10 ten watt crystal-controlled radio.

Twelve-hundred baud is not dead by a long shot, but in today's market I would not buy a new TNC unless it had both 1200 and 9600 baud capability. Having said that, why not add 19,200 baud capability and make it a trio (e.g., KPC-9612)?

Now imagine surfing the Internet using NETSCAPE™ from your car (parked out of harm's way), but using a baud rate *faster* than 9.6 Kb. As a friend of mine said, "Surfing the World Wide Web (WWW) at 9600 baud is like kissing your sister."

OEMs, the ball is in your court!

The "Packet Picture" As Related To APRS

The goodies are beginning to appear for the APRS SIGs from almost every OEM of packet equipment.

Using the Internet link from here in my lab, I've been "surfing" the Internet, reading the messages in the APRS sig @ TAPR. Pete Lascell, W4WWQ, pointed me in the direction of the APRS sig on the Internet. To make requests or subscribe to the "aprssig" use the following procedure:

Address the "listproc@tapr.org." Do not put anything in the SUBJECT line. In the text of the message enter in lower case "subscribe aprssig (your name)." To *un*scribe, use the same procedure, except replace the word "subscribe" with the word "unsubscribe."

If you wish to have information on how the list server works, use the above addressing (request) scheme. Instead of using the word "subscribe," replace it with "help."

The interest in the Automatic Packet Reporting System (APRS™ Bob Bruninga, WB4APR) has further prompted the packet controller manufacturers to embed codes and remote access configuration so we can enjoy the APRS features even more.

A couple of months ago (August 1995) I told you about the new Kantronics APRS support in the KPC-9612 and the KPC-3. PacComm and MFJ were also supporters of APRS.

In the May 1995 column I told you about the new AEA PK-12. As a point of interest, I got into some hot water with WB4EDZ because of the method I used to build the May 1995 "Packet User's Notebook" column. I'm not going to cover that episode again, but you can glance back at the May 1995 column and read it for yourself. This is one time when my wife, Jean Ann, truly convinced me "who's on first"!

The APRS Upgrades Are Getting Better

AEA's PK-96 and PK-12 have upgraded GPS firmware; PC PAKRATT LITE™ and WB4APR'S APRS™ software are included. Advanced Electronic Applications' PK-96 dual-speed 9600/1200 bps packet controller is now shipping with GPS firmware.

The PK-96 now includes in the packaging AEA's PC PakRatt Lite™, the packet-only, DOS TNC terminal control software, and the Automatic Packet Reporting System (APRS™) software developed by Bob Bruninga, WB4APR) for GPS use, as does AEA's PK-12 1200 bps packet TNC.

Just a few months ago AEA put the GPS firmware in the PK-12, 1200 bps packet TNC. Already AEA has improved the GPS firmware in the PK-12 and added it to the PK-96. The new GPS firmware incorporated in both the PK-12 and PK-96 automatically detects if there is a GPS receiver connected to the TNC upon power-up. If a GPS receiver is detected, an initialization string will be sent, and the TNC will be ready for GPS work; if no GPS receiver is detected, the TNC will be ready for traditional packet data work.

The biggest new feature of the AEA's PK-96 and PK-12 is that the GPS commands can be programmed remotely. In Stand Alone Tracking applications where a TNC, GPS receiver, and radio (no computer) are installed in a vehicle, the unit does not need to be removed and connected to a computer to change GPS parameters. It all is done remotely. PK-96s and PK-12s automatically transmit their position information at user-defined (timed) intervals, and now also can be remotely polled for GPS location information at any time. This remote polling is great for those who use the TNCs in a Pete Bros. ULTIMETER-II™ weather setup.

Each member of a group in a region can set up a weather station in the backyard. Then other members can poll (at any time) the various weather stations for information. Doing this forms a picture of the region's weather on the Automatic Packet Reporting System (APRS™) map. In addition, certain GPS receivers can be remotely programmed via the PK-96 or PK-12. You can even configure the system to transmit

location information when a button on the radio control head is pushed.

Other new GPS firmware features include time and date setting from the GPS receiver, remote programming of the GPS receiver itself, and the ability to operate as a WIDE and RELAY digipeater. Exact time and date information can be extracted from the GPS receivers to set the PK-96 and PK-12's internal clocks. The way in which AEA engineers built the TNCs' firmware allows remote programming of some GPS receivers via the TNC. The ability to operate as a WIDE and RELAY digipeater means that mobile packet users can be transmitting their position information in a Stand-Alone Tracking configuration and still act as a message forwarding mailbox—all while mobile.

Both TNCs work with AEA's APRS Adapter Cable, which saves a communication port on the computer. This cable allows the TNC and GPS receiver to connect to a single COM port. The cable is important when used with laptop computers because there is only one free COM port available.

AEA has developed significant technological advancements for GPS packet applications with the PK-96 and PK-12. Packet users can now choose which full-featured TNC they wish to use—the dual-speed PK-96 9600/1200 bps TNC or the PK-12 1200 bps packet controller—and join in GPS excitement either way.

GPS firmware upgrades for early PK-96s and PK-12s are available directly through AEA for $10 (free shipping). Call the AEA Upgrade Hotline at 206-774-1722 to order the GPS upgrade. The PK-96 and PK-12 packet controllers and AEA APRS Adapter Cable, as well as the rest of AEA's quality product line, are available from amateur radio dealers. For more information about AEA products, call AEA's Literature Request line at 1-800-432-8873, or FAX to 206-775-2340.

FCC Proposed Closings

Date: Fri, 18 Aug 1995 15:46:11 -0400 (EDT)
From: w1aw@arrl.org
Subject: ARLB082 FCC proposes closings
Sender: owner-w1aw-list@netcom.com
To: QST@arrl.org
Message-id: <$arlb082.1995@ampr.org>
Organization: American Radio Relay League
MIME-version: 1.0
Content-type: TEXT/PLAIN; CHARSET=US-ASCII
Content-transfer-encoding: 7BIT
Precedence: list

SB QST @ ARL $ARLB082
ARLB082 FCC proposes closings

ZCZC AG49
QST de W1AW
ARRL Bulletin 82 ARLB082
From ARRL Headquarters
Newington CT August 18, 1995
To all radio amateurs

SB QST ARL ARLB082
ARLB082 FCC proposes closings

Federal Communications Commission Chairman Reed Hundt has proposed actions to save money, including personnel reductions and facility closings.

Hundt said that although the FCC currently has fewer than its authorized personnel ceiling of 2,271, steps would be taken to reduce the number of FCC employees to about 2,050. In addition to retirements and buyouts, the closing of some regional and field offices would result in about 120 jobs lost, of which some 50 would be involuntary. Hundt said these 50 "reductions in force," or RIFs, would be the first in FCC history.

Regional offices would be closed in Atlanta, Boston, and Seattle, leaving their functions to regional offices in Chicago, Kansas City, and San Francisco.

The following field offices would be closed (leaving 16 still open): Buffalo, Miami, St Paul, Norfolk (Virginia), Portland (Oregon), Houston, San Juan, Anchorage, and Honolulu.

All nine monitoring stations would be closed, as well as monitoring operations within four FCC field offices.

"Fortunately," Hundt said, "technological advances will permit us to replace these monitoring stations with a national automated monitoring network by the summer of 1996."

These nine monitoring stations are at Vero Beach, Florida; Belfast, Maine; Allegan, Michigan; Douglas, Arizona; Livermore, California; Ferndale, Washington; Grand Island, Nebraska; Kingsville, Texas; and Powder Springs, Georgia.

Hundt said, "No monitoring function will be impaired." One facility, in Laurel/Columbia, Maryland, would be the central site for "electronic monitoring."

If approved by the full Commission, the monitoring stations and field offices would close by July 1996. No timetable was given for closing of the four regional offices. (end of message)

The following is not an editorial, but it is a concern. Somehow there seems to be a trend for government to follow the actions of some big businesses. There is only one problem with their actions: the government actions are about five years behind.

At a time when businesses are beginning to grow and the hiring of additional personnel could soon create a shortage of people power, the government is "down-sizing" in areas where it could create the most problems. Maybe it's a way of side-stepping the issue of political *appointments* by dumping the jobs with the least *political damage*.

Where am I going with this topic? I don't really know, but in the last month, I've learned of two areas of importance where the Federal Government has proposed the reduction in staff to such a degree that it causes me to be concerned for the welfare of (1) our valuable spectrum, and (2) the weather facsimile early warning system that is used by so many boating and sailing vessels at sea, not to mention the large number of WeFAX users around the world.

What Do You Mean, "WeFAX Is Going To Go Away"?

You read it correctly. Last month while I was receiving weather faxes of Hurricane Felix approaching the coast of Virginia and North Carolina, I received a WeFAX *text* message that eluded to the cessation of the shortwave WeFAX service.

It was a long moment as I read the message. What will we do for weather maps and overlays when an impending storm or disastrous weather is approaching? Much of the information used by the Sky Warn and Weather Watch groups is based on information received from the National Weather Service and from the WeFAX frequencies at 3357 and 8080 kHz.

In the Southeastern Emergency Digital Association Networks (SEDAN) we depend on information gathered by System Node Operators (SNOs), Sky-Warn, and the Weather Watch groups as an adjunct to our network early warning system. The thought of losing the WeFAX and/or the National Weather Service stations is just cause for many of us to have real concerns for our future safety and welfare.

In short, the loss of the WeFAX system would create a void that could consequently result in the loss of life, health, or property.

There Are Other Ways

The first retort to my column this month: "Well, Buck, what should, or would, you do to reduce government waste?"

Whatever the answer is, I don't feel that it lies in the two areas where our most active developments have occurred in the last ten years. There are better ways to circumvent the problems at the government level. If money saving is the name of the game, and budget balancing is what we are after, it could be time to look at the enormous salaries that the political syndicate is taking out of our budget.

In The FCC Arena

There has been monumental growth in the PCS and cellular fields, not to mention the increase in licensing in all communications media, including amateur radio. At a time when spectrum coordination is at a premium, and deregulation has opened up the little "blank box"™ to every type of RFI known (and some unknown), the FCC is down-sizing!

Who is going to develop a cloaking for Electronic IDs? The manufacturer, of course, but the FCC should be the watch-dog to help keep it to a "standard," or it could become the birth of color television all over again.

Who Has The Best Mouse Trap?

Shall we approve the spinning color wheel, or shall we go with the NTSC (Not Twice the Same Color), 6 MHz wide system that we now have? This is an area where the FCC could really prove to be useful.

Some of our concern is directed to the loss of our monitoring stations. Adding to our concern for closer monitoring of the airwaves are some of the recent problems caused by illegal users interfering with the aircraft and control-tower frequencies.

Dropping the monitoring stations would then seem to be a step backwards. Listen sometime to the SSB frequencies just below 14 MHz, to the clandestine use of spectrum by . . . some unscrupulous operators. Some of these transmissions relate to more than just a simple delivery of medical prescriptions. Maybe I'm naive, but I thought some of the monitoring station use was for just such services (DEA related).

Turning To The Weather Picture

We've looked at some of the need for FCC uses other than licensing. Now let's look at what's happened to the worldwide weather picture.

Having lived on this planet more than half a century, I've seen a vast change in the weather patterns, giving rise to concern. In recent years the number of seasonal storms has increased. Whether it is related to "global warming" or to the "big-bang" theory, we are seeing a pronounced increase in destructive weather. Floods, hurricanes, tornadoes, and the like make me uneasy when I think of what would happen if our weather facsimile and weather stations were to go away.

Not everyone has access to the weather channel, and if they do, by the time they get through the commercial breaks to see what's in store for their area, the storm may already have hit and gone. The weather facsimile (WeFAX) and weather service stations have become a very supportive asset that we rely on as part of our weather related *early warning systems.*

If these proposed changes are approved just to save money and help balance the budget, while possibly leading to the loss of human life, then these two ideas have already failed the compatibility test and should be relegated back to the laboratories with the nerve gases and DDT.

73, de BucK4ABT

CONTEST CALENDAR

BY JOHN DORR, K1AR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Operating Tips For The CQ World-Wide DX Contest

November's Contest Tip

Log checkers will usually tell you that incorrectly copied callsigns is the most common mistake in contest logs. When CQing and running other stations, always repeat the callsign of the station you are working. Even though you may be absolutely certain that you copied the callsign correctly, a repeat of the call will allow the other station to correct any possible mistakes. It's worth the time!

As many of you read this (at least in the U.S.), the CQ WW DX SSB Contest is nearly upon us. From its infancy in 1948, the CQ WW has steadily grown into the world's most popular contest when judged by participation. Although similar to most other DX contests from an operating standpoint, the WW has some unique operating strategies one can employ to maximize scoring.

Many of the following thoughts can be considered as little more than common sense. Some reflect the experience I've gained from operating this contest for 25 straight years. No matter what, I hope you find them useful.

Preparation

There is, of course, a standard list of items one can think of when preparing for any contest. For example, there's the obvious areas of sleep, food, shack readiness, and antennas. The CQ WW Contest has a few unique attributes that go beyond normal considerations, however.

In case you are not aware, the WW contest committee recently added the country of African Italy (IG/IH) to the CQ WW country list. And, as you may expect, there will be quite a bit of activity from this spot in this year's contest. Because of the unique nature of the WW country list, it's always helpful to have an up-to-date country file in your computer as well as in your head! Spend a few minutes reviewing the current lists, remembering that this is the DX contest that permits credit for countries such as the Shetland Islands, European/Asian Turkey, Sicily, and so on.

While on the subject of multipliers, *CQ*'s unique use of zones makes awareness of upcoming contest DXpeditions (and resulting multipliers) even more critical. For example, did you know that an operation is being planned from JT (Zone 23) by an American group? With the widespread availability of information (Internet, newsletters, packet, etc.) about contest operations, there's tremendous opportunity to be knowledgeable about activity in the contest—including callsigns. Of course, being especially active on the bands a week or so before the contest is invaluable as well.

c/o CQ magazine
Internet: p00259@psilink.com
Compuserve ID: 71301,424

Calendar of Events

Oct.	**28-29**	**CQ WW DX SSB Contest**
Nov.	4-6	ARRL CW Sweepstakes
Nov.	11-12	Worked All Europe RTTY Contest
Nov.	11-12	OK/OM DX Contest
Nov.	18-20	ARRL SSB Sweepstakes
Nov.	**25-26**	**CQ WW DX CW Contest**
Dec.	1-3	ARRL 160 Meter Contest
Dec.	3	QRP ARCI Holiday Sprint
Dec.	9-10	ARRL 10 Meter Contest
Dec.	31	ARRL Straight Key Night
Dec.	31	RAC Canada Winter Contest

The months of October and November offer the best HF propagation opportunities of any month in the year. I can imagine some of the laughter I'm getting now as you ask, "What HF propagation?" While it is true that we're finally at the bottom of the sunspot cycle, there's no better time to possibly experience limited 15 and 10 meter openings than during the months of October and November. Be keenly aware of propagation data as you prepare for the contest. I find that I listen to the WWV propagation data at 18 minutes past the hour during these months more often than during any other part of the year. Even when considering the part of the cycle we're currently in, it's not out of the realm of possibility to experience unusual band openings—especially if you're prepared to look for them.

Finally, while the following may seem obvious, it's worth briefly mentioning. If you think about it, the CQ WW is largely a callsign copying contest. Unlike most other contests, transmitter powers, serial numbers, and other common data elements are not part of the contest exchange. For this reason, you can actually get a little lazy, especially if you're using a computer logging program. In addition to ensuring that the zone portion of your logging software's country file is absolutely correct, it's not a bad idea to review a zone chart ahead of the contest. At the risk of stating the obvious, consciously copying the exchange during the contest (rather than letting your computer fill it in for you) is part of this point. Remember, many a QSO has been removed from CQ WW logs because the operator entered the wrong zone.

CQ Hall of Fame members Dick Norton, N6AA, and Jim Neiger, N6TJ, surround Mexico's finest CW contester, Pepe, XE2MX.

Operating The Contest

Without a doubt, the CQ WW Contest has the most participants of any DX event in the world. For this reason, "operating smart" is a big consideration. It should be no surprise to you this year that 20 meters will be packed. If you're operating from W3LPL or KC1XX, this is not a problem. But what if you're using a tribander at 45 feet from a station in Minnesota? A little common sense and intelligent operating practice can make this limitation rewarding as well.

The high activity levels of the CQ WW Contest can actually make for more fun from a small station. If you are forced to operate in a "search and pounce" mode, there's simply more people to work in this contest. When compared to a small specialty event such as the HA DX contest, there are a tremendous number of stations to call across all of the bands at any point in time. This is a unique aspect of the CQ WW that makes for its tremendous popularity.

A second operating consideration is that the CQ WW is, by its very name, a worldwide contest. Unlike the ARRL DX contest, the CQ WW doesn't have DX participants combing the bands looking for W/VE stations. You have to operate with this in mind. I can recall numerous times when I've called scores of unanswered CQs on 20 meter SSB during the beginning of the morning European opening, only to discover that a very loud YU station (whom I can't hear) is running other Europeans and/or JAs on the same frequency! This has also been the case for low-band operating. I'm sure many of you can recall situations in which you've heard a very loud and very rare DX multiplier who insists on operating transceive on 7055 kHz, never listening up for North America. In the CQ WW Contest North America plays a much smaller role in the scheme of things, and you need to operate with that in mind.

The use of zone multipliers is an important aspect of the WW Contest—both in preparation and while actually operating. I still get a kick from working a "double multiplier" such as a 3B8 in Zone 39 on 40 meters. Because zones and countries bear equal weight in WW scoring, it's important to always be aware of your zone (and country) totals. In addition, you should be conscious of the contribution of a double multiplier to your score and the trade-offs that come from not taking the time to work

it. Most logging programs provide this trade-off information right on your screen. If you need 14 QSOs to equal the scoring contribution from working a double multiplier and feel that those QSOs can be worked faster than the guy you're calling, the strategy is simple—spin your VFO! It's very easy in this contest (as it is with sections in the ARRL Sweepstakes) to become overly enamored with zone chasing. Working all 40 zones on a band is a rare thing, although it has been done many times. Few have won, however, by making a "zone sweep" the top priority of their operating strategy.

Let's move on to another growing operating tactic—passing multipliers. When thinking back to the operating tactics of a decade or so ago, the practice of asking stations to move to another band was a rare operating practice indeed. Now it's commonplace. Some DX stations rightly will comment that it's too commonplace. For many stations, though, moving to another band to help a serious competitor is not a problem. For this reason, it's still a good operating approach—even from a small station. And when you consider the scoring advantage that comes from moving a "double multiplier," the strategy becomes even more important.

Although we've only just scratched the surface on this topic this month, I'm sure you can think of your own list of operating methods that uniquely take advantage of the CQ WW Contest. There's one basic tenet that applies to contesting in general and the CQ WW in particular—basic intuition. While good operating strategy comes in part from experience, the majority of sensible operating comes from what seems natural. If you take a few minutes before this year's contest and think about the ways you can improve your score (from a CQ WW-specific standpoint), I guarantee that your scores and abilities will improve!

WRTC-96

Many of you may recall, the first World Radio Team Championship was held in Seattle, Washington in 1990. For this event, two-person teams comprised of some the world's top

operators were pitted against each other in head-to-head competition. To emphasize operator ability, each team ran equal power and operated from stations using similar antenna systems and were located in the same geographical area. It was truly a unique experience, as leading contesters from all over the world gathered together to share in this unprecedented event.

The Northern California Contest Club (the NCCC) has announced that they will be assuming the role of coordinating WRTC-96, scheduled to take place in conjunction with the 1996 IARU HF Championship on the weekend of July 13 and 14, 1996. This is going to be one of contesting's major events, and you can expect to hear more about it in upcoming months. If you would like more information about WRTC-96, contact Rusty Epps, W6OAT, at 651 Handley Trail, Redwood City, CA 94062, or via e-mail at "epps@netcom.com".

XE2MX and The Boys

As you'll notice this month, I've included a candid photo of Pepe, XE2MX, together with CQ Contest Hall of Fame members Jim Neiger, N6TJ, and Dick Norton, N6AA. If you've operated almost any DX contest in recent memory, you couldn't help but bump into the fine signal of XE2MX. Pepe's superior operating style makes him one of contesting's outstanding CW competitors. Keep up the good work, Pepe!

Final Comments

Well, that's it for this month. Just as a reminder, time is running out for you to submit your 1995 *CQ* Contest Survey (found in the September *CQ* "Contest Calendar"). Although I haven't begun tallying the results, I am struck by the fact that I have nearly half a foot of responses sitting on my file cabinet! Be sure to send your entry today!

As always, send me your contest announcements for the February issue no later than December 1st. 73 John, K1AR

Some Tips for Maximizing Your Score in the CQ WW DX Contest

Preparation

- Look out for the new IG/IH African Italy multiplier.
- Always review the latest CQ WW country list.
- Be especially active the week preceding the contest; watch for contest expeditions.
- Be knowledgeable about propagation—especially during the prime months of October and November.

Operating

- Searching and pouncing can be very productive in the CQ WW because of high activity levels.
- Be aware that the WW is a worldwide contest. Lack of answers to your CQs may result from unheard QRM in another part of the world.
- Take advantage of the unique zone multipliers found in the CQ WW. Always measure the trade-offs between multipliers and QSOs.
- Don't get caught upin trying to work all zones at the expense of overall score.
- Judiciously pass multipliers where appropriate. Look especially for double multipliers when doing this.

ARRL Sweepstakes

CW: Nov. 4–6 Phone: Nov. 18–20
2100Z Sat. to 0300Z Mon.

This is the 62nd running of the Sweepstakes, making it the oldest domestic competition going. It really stirs up a lot of activity.

Operation is limited to stations in ARRL sections. Operating periods are restricted to a maximum of 24 out of the 30 hour contest period. Times off may not be less than 30 minutes and must be clearly indicated in your log.

In order to minimize QRM to non-contesters, it is recommended that operation be confined to certain portions of the bands. Check out the complete rules in *QST* for details.

There are several other regulations, including a cross-check sheet if you make 200 or more contacts. A large SASE (45 cents in postage) will get you the "SS Package" and Operating Aid #6 with enough log and summary sheets for an average outing.

Exchange: QSO number, power class, call, last two digits of year first licensed, and your ARRL section. Stations using 150 watts or less

are classed "A," over 150 watts "B," and QRP "Q." The same station may be worked only once regardless of the band.

Scoring: Each completed QSO is worth 2 points. The multiplier is derived from the number of ARRL sections.

Awards: The usual certificates in each class and mode for single operator stations in each section and multi-operator stations in each division.

Last year's trophy program has been expanded. In addition, taking off on last year's highly successful program, the ARRL will be offering SS pins to participants with 100 QSOs or more (cost is $5 pp.). In addition, SS coffee mugs will be made available to participants achieving a "clean sweep" ($10 pp.).

Logs must be postmarked no later than 30 days after the contest and go to: ARRL, Communications Dept., 225 Main Street, Newington, CT 06111.

European RTTY Contest

0000Z Sat. to 2400Z Sun., Nov. 11–12

Rules for the WAEDC RTTY contest are for the most part the same as for the CW and Phone sections held in August and September. There is one main difference, however. To generate more activity and increase the QSO points, contacts with stations worldwide are permitted. QTC traffic, however, is not permitted within your own continent. Only 36 hours of operating time (out of 48 possible hours) are permitted for single operator stations. Off-times must be at least one hour in duration.

Exchange: RST plus a progressive QSO number.

Points: Each QSO and each QTC exchanged is worth one point. QTCs may be sent/received worldwide between continents (limit of 10).

Multiplier: Multipliers are determined from the DXCC list.

Bonus Multiplier: Multiply your multiplier on 80 meters by 4, on 40 meters by 3, and on 10/15/20 meters by 2.

Awards: Certificates will be awarded to the highest scorers in each country with a reasonable score. Continental leaders will receive a plaque. Certificates will also be awarded to stations with at least half the score of the continental leader.

It is suggested that you use the official DARC log forms. A large SASE (IRCs) to the address below will get you a supply.

Mailing deadline for all entries is December 15th to: WAEDC Contest Committee, Postbox 1328, D-8950 Kaufbeuren, Germany.

OK/OM DX Contest

0000Z Sat. to 2400Z Sun., Nov. 11–12

This popular event is sponsored by the Czech Radio Club and is open to all amateurs worldwide on both modes. The goal is to work as many OK/OM stations as possible (non-OK/OM can only work OK/OM stations) on 160–10 meters.

Classes: Single Operator, SSB/CW/Mixed, Multi-Operator/Mixed and QRP.

Exchange: RS(T) and serial number. OK/OM stations will include their three-letter district code.

Scoring: Credit 3 points for OK/OM QSOs (1 point from Europe). Multiply total QSO points times the total number of OK/OL/OM prefixes worked per band and mode.

There are a variety of awards available to category winners. Entries must be postmarked no later than December 15th and sent to: Karel Karmasin, OK2FD, Gen. Svobody 636, 674 01 Trebic, Czech Republic.

CQ WW DX CW Contest

0000Z Sat. to 2400Z Sun., Nov. 25–26

Just a reminder, as if you needed one, that the CW section of our WW DX Contest is coming up the last weekend of this month. The Phone section of course is past history. Complete rules were published in the September issue. The contest trophies list has been updated and is well covered in the rules.

All logs, both Phone and CW, must be sent to the *CQ* office: CQ World-Wide DX Contest, 76 North Broadway, Hicksville, NY 11801 USA.

Deadline for logs for the Phone section is December 1, 1995, and for the upcoming CW section it is January 15, 1996. **Be sure to indicate Phone or CW on your envelope.** This will avoid your log from being entered in the wrong section.

ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

Fall Frolic

This month we cover all bases, beginning with antenna notes, and making our way through computer and software happenings, publications of interest, and some mail we've received. We'll wind up with our "Looking Back Five," so lets get started!

Antenna Notes

Phase 3D Satellite Project. Communication through amateur radio satellites is one of the current "hot" areas in amateur radio. Since 1961, when the first Orbiting Satellite Carrying Amateur Radio (OSCAR) was launched, we amateurs have communicated via satellite over thousands of miles using very high frequencies (VHF) and ultra high frequencies (UHF), wavelengths traditionally used for relatively short distances.

A new era arrived in 1983, when the first Phase III satellite, OSCAR 10, was launched. Its highly elliptical orbit allowed amateurs in the northern hemisphere to use it on a 10- to 12-hour basis, over intercontinental distances. Later, packet-radio-capable, low earth orbit Microsats added new dimensions to satellite communications. However, as you probably know, today there is only *one* amateur radio satellite, OSCAR 13, that's capable of providing reliable intercontinental communications. Unfortunately for us all, it soon will plunge into the atmosphere and be destroyed, probably in December 1996, ending a promising era.

The Phase 3D satellite is envisioned as a replacement for OSCAR 13, but it's more than that. It's by far the largest and most advanced amateur satellite ever built, being aimed at reducing the cost and complexity of satellite-capable amateur stations, plus adding new frequency and data format choices.

The new satellite will have a large array of transmitters, receivers, and antennas onboard for frequencies from 21 MHz to 24 GHz. The RF output of its 2 meter transmitter, for example, will be about 200 watts, with an effective radiated power (ERP) of 2500 watts! Compare this with the 50 watt (180 watt ERP) OSCAR 13 on 2 meters. These stats mean that if you're operating Mode B (in which you transmit on 435 MHz and receive on 2 meters), you won't need a large beam as required for working through OSCAR 13, and you may not even need a mast-mounted receiving preamp.

The new satellite also will be easy to find, since its orbit will place the satellite at the same position above your horizon every 48 hours; if the satellite is above your horizon, you'll be able to use it. This means that if you don't have to work the satellite for the full time it's available, you can just aim your antennas at a point in the sky and leave them there, eliminating the need for azimuth and elevation rotators. This will be a blessing for amateurs in apartments and condos, where they may be lucky to erect *any* kind of antenna.

289 Poplar Drive, Millbrook, AL 36054

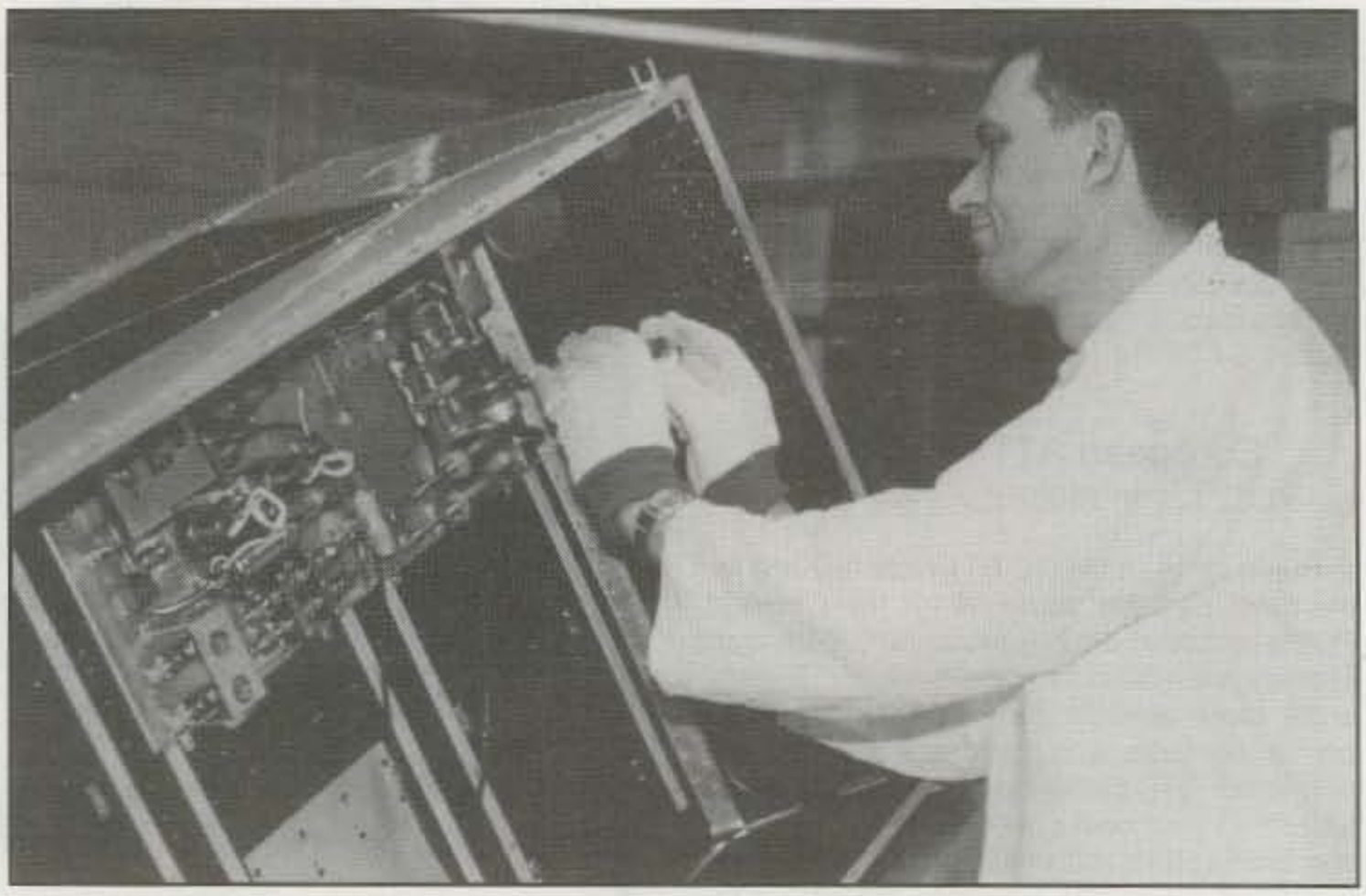

Photo A– Assembly and checkout of the AMSAT Phase 3D satellite is taking place in Orlando, Florida for planned launch in May 29, 1996. Here Dr. Dieter Zube installs a portion of Phase 3D's flight model Propellant Flow Assembly (PFA) into the spacecraft. The PFA controls the flow of propellants to the kick motor as well as the flow of ammonia to the satellite's arc jet positioning motor. The kick motor is used to place the satellite into its final orbit. (AMSAT-NA photo by Dick Daniels, W4PUJ)

The Phase 3D satellite is an international project, with work being done in Germany, South Africa, Finland, Slovenia, the Czech Republic, Belgium, Japan, and other countries besides the United States. Assembly and checkout is taking place in Orlando, Florida. Launch, aboard the second test flight of the European Space Agency's new heavy-lift Ariane 5 vehicle, will be from ESA's complex at Kourou, French Guiana. Launch is set for May 29, 1996. Keith Baker, KB1SF, AMSAT Executive Vice President, sent us a series of interesting photos showing some of the hardware details of the new satellite, demonstrated by members of the Phase 3D Project Team as they prepare for launch. These details are shown in photos A through D. (For an overview of Phase 3D and the satellite-based future of amateur radio, check out May *QST* (after you've finished this issue of *CQ*, of course!) for Steve Ford, WB8IMY's article, "Phase 3D—The Ultimate EasySat."

For information on AMSAT membership, ways to contribute to the project financially, and a current catalog of AMSAT publications and software, contact AMSAT, 850 Sligo Ave., Suite 600, Silver Spring, MD 20910 (301-589-6062). You also can make contributions to the ARRL Satellite Fund at 225 Main St., Newington, CT 06111-1494 (203-666-1541).

Photo B– In this AMSAT-NA photo Mike Garrity, N4OZC, displays a flight model prototype of the Phase 3D's S-band antenna. The new satellite will have a large array of transmitters, receivers, and antennas onboard for frequencies from 21 MHz to 24 GHz. (AMSAT-NA photo by Keith Baker, KB1SF)

Sirio Communication Antennas. Electronic Distributors Corp. (EDCO) is the exclusive North and South America distributor for Sirio antennas, offering them through a network of over 65 EDCO dealers. The "Hi-Performance" line of mobile antennas includes seven models, with four monoband models for 2 meters or 70 cm and three dual-band models for 2 meters and 70 cm.

The antennas are fabricated of high-quality materials for maximum strength and performance. The whips are very flexible and include a "custom inclination system" that allows them to be tilted up to 90 degrees without the use of keys or special tools. Particular attention has been paid to the UHF-type male antenna mounting connector, which uses a gold-plated center pin, Teflon® insulation, and a silicone rubber O-ring weather seal.

Other features include a low-loss insulator with brass insert soldered at the loading coil, a high-Q air-wound coil for low dielectric loss, and a high-voltage ceramic capacitor. The Sirio antennas come factory-adjusted with no additional tuning normally being required. Several mounts are available, including a black metallic gutter mount and a magnet-mount base.

For more information on the Sirio antennas, contact EDCO at 325 Mill St., Vienna, VA 22180 (703-939-8105).

Square D SURGEBREAKER Protectors. A flash of light and a crack of thunder jolt you awake. You think no harm is done, but the next day you discover your freezer has been defrosted. Worse, your TV, VCR, computer, answering machine, or rig doesn't work.

Is this scenario familiar to you? If so, you're the victim of a power surge. As most of us are well-aware—I've gone through several such experiences myself—power surges can seriously damage electrical appliances and radio gear, and can cause unseen damage to the wiring in your home's electrical system. Power surges are caused by many different things—inductive switching, power switching, lightning, etc. The surges travel down the utility lines that come into your main electrical panel.

Ordinary circuit-breaker panels react much too slowly to lightning-induced charges to be useful in protecting electrical equipment and appliances. A "whole-house" surge arrestor can protect all of the AC wiring circuits in your home from surges. The newest, least expensive, and easiest to install whole-house surge arrestors are built into standard plug-in circuit breakers.

To install them, you mount them in your electric breaker panel like any other circuit breaker and attach a single wire to ground. Whole-house surge protectors still won't save your equipment from a direct hit, but they can do wonders protecting your gear from lesser but still damaging electrical perils.

The Square D Company offers the SURGEBREAKER™ Secondary Surge Arrester that protects secondary electrical wiring and appliances. The devices handle voltage surges up to 20,000 volts, diverting excess energy to ground. They effectively reduce voltage surges to a level that can be handled by your electrical system and surge suppressors located downstream from the main electrical panel. The plug-in SURGEBREAKERS are UL-listed, meet National Electrical Code requirements, and have an LED indicator that displays operational status.

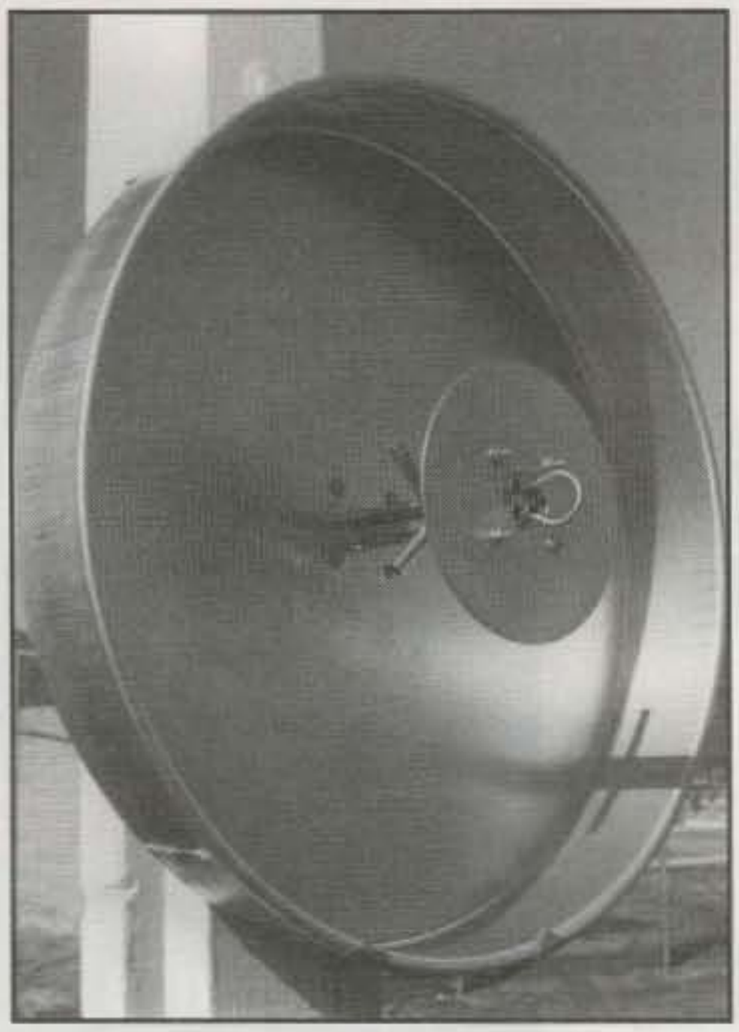

Photo C–The completed Phase 3D flight model L-band antenna is undergoing gain and pattern testing at the Orlando integration facility's antenna test range. Preliminary gain measurements show a gain of about 15 dBi with a surprisingly clean radiation pattern. (AMSAT-NA photo by Keith Baker, KB1SF)

We should note that there is a place for the more common "point-of-use" surge suppressor strips and cubes, which typically handle surges up to 6000 volts. Such inline, shunt-type AC transient voltage surge suppressors offer protection from spikes and momentary but potentially destructive overvoltage conditions. They do this by clamping or limiting voltages to a safe level.

Some surge suppressors also offer protection from electrical noise, such as broad-spectrum electromagnetic interference/radio frequency interference (EMI/RFI) reaching your equipment through the power lines. Such units can provide as much as 60 dB of filtering. For protecting especially sensitive radio equipment, a combination of whole-house and point-of-use suppressors installed and grounded close to the protected equipment can be highly effective for minimizing the negative effects of AC surges.

For more information on SURGEBREAKER, contact Square D Company, P.O. Box 1258, Waukesha, WI 53187 (1-800-888-2448).

Computer and Software Notes

EZNEC Antenna Modeling Software. Amateur antennas used to be designed by the seat of the pants or by using stubby pencil and calculator. Either way, final performance characteristics were hard to predict. Now you can do your calculations on your PC. With antenna modeling programs, it's relatively simple to calculate the dimensions for all sorts of antennas, including dipoles, quads, Yagis, loops, and verticals.

Several times previously, and most recently in the August 1993 column, we discussed ELNEC for the IBM PC and compatibles. The highly capable program has been improved several times, and now a complete step-up is available in the form of EZNEC—billed as "ELNEC on the outside . . . NEC-2 on the inside."

EZNEC, priced at $89 vs. ELNEC's $49 pricetag, overcomes many of ELNEC's limitations because it's based on the powerful NEC-2 code rather than on MININEC. And it does this without compromising the friendly, easy-to-use interface found in ELNEC.

EZNEC (figs. 1, 2, and 3) has all the features

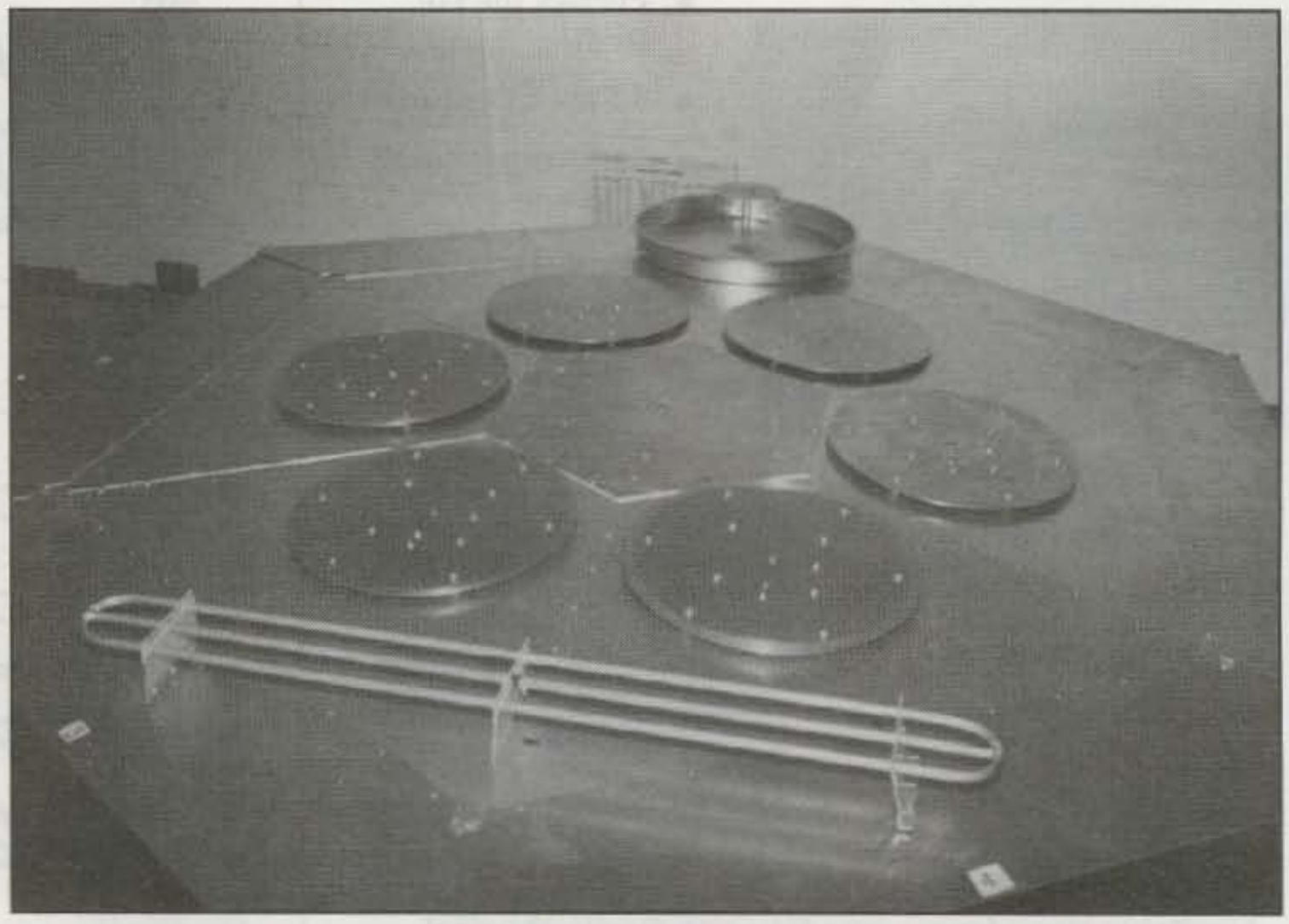

Photo D– A full-scale mockup of the Phase 3D satellite's top panel tests antennas without disturbing ongoing spacecraft integration efforts. Here one of three V-band dipoles, as well as the U-band patch array and L-band short backfire antennas, are visible on the mockup. (AMSAT-NA photo by Keith Baker, KB1SF)

```
                EZNEC  ver. 1.0
        (c) 1995  by Roy Lewallen, W7EL

TI  TITLE:                  NBS Yagi (ANT. BOOK p. 18-7)
FR  FREQUENCY:              50.1 MHz. (wavelength = 235.5859 in.)

WI  WIRES:                  3 Wires        WL  WIRE LOSS: Zero
SO  SOURCES:                1 Source       UN  UNITS:     Inches
LO  LOADS:                  0 Loads
TL  TRANSMISSION LINES:     0 Lines
GT  GROUND TYPE:            Free Space

                                           LAST FILE SVD/RCLD:
                                           C:\HAM\EZNEC\ANT\LAST.EZ

PT  PLOT TYPE:              Azimuth        RF  REFERENCE: 0 dBi
PA  ELEVATION ANGLE:        0 Deg.         SZ  SWR Z0:    75 ohms
PR  PLOT/TABLE RANGE:       0 - 360 Deg. (full)  FI  PLOT FLDS: Tot fld only
SS  STEP SIZE:              1 Deg.
OR  OUTER RING OF PLOT:     Automatic scaling

(BR)owse file   (DE)lete, (RE)call, (SA)ve desc   (Freq S)wp   <RET> = Plot
(AN)alyze  (CU)rrents  (Guideline C)k  (Load D)ata  (OP)tions  (Print D)esc
(Src D)ata  (TA)ble  (View A)nt  (EX)it pgm without saving desc  (QU)it
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Fig. 1– Here's the main menu of Roy Lewallen, W7EL's new antenna modeling software package, EZNEC. Priced at $89, it has much the same friendly, easy-to-use interface found in his popular modeler, ELNEC, but offers significantly enhanced capabilities. Here it's set up to model an NBS Yagi as found in The ARRL Antenna Book.

of ELNEC. These include spreadsheet-style data entry; three-dimensional antenna display, with currents and antenna pattern superimposed; the ability to rotate wires and change wire lengths or height with a single entry; frequency sweep; multiple plots on the same screen; one-key analysis to display gain, front-to-back (F/B) ratio, beamwidth, and other important information; and inclusion of true current as well as voltage sources.

The new program has some additional features as well. These include fast operation; the ability to handle complex antennas of up to 500 segments, more than twice the capability of ELNEC and its extra-cost MaxP ("Maximum Pulse") option combined; an automatic "guideline check" to warn if several modeling guidelines have been exceeded or if parameters are

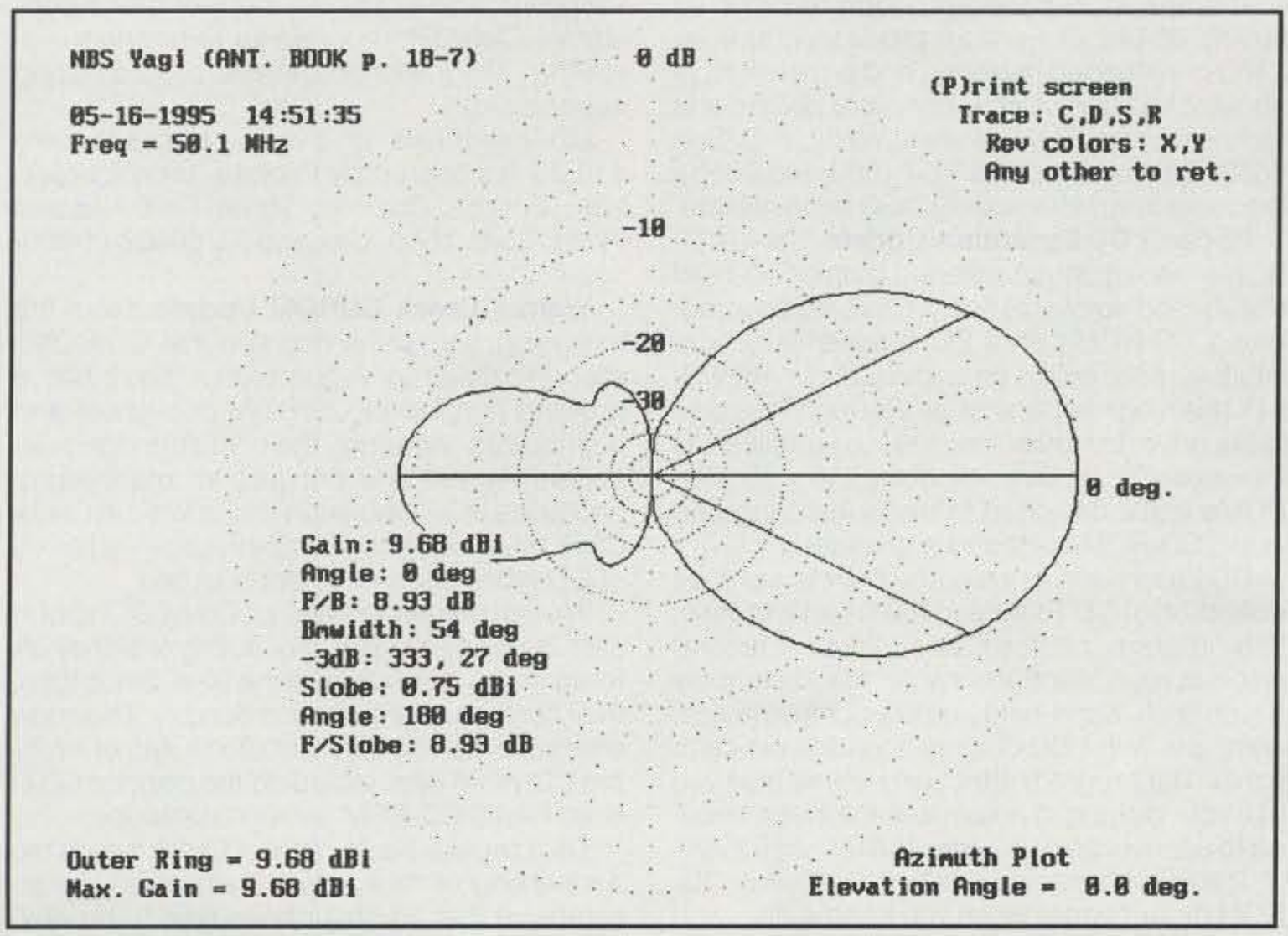


Fig. 2– Shown is a typical screen plot generated by W7EL's EZNEC. In this case, it's an azimuth plot depicting the NBS Yagi of fig. 1. A special analysis feature tells you the forward gain, F/B or front-to-side ratio, beamwidth, angles of the 3 dB pattern points, major sidelobe level, and front-to-sidelobe ratio. You can include these points on the plot, as we did here.

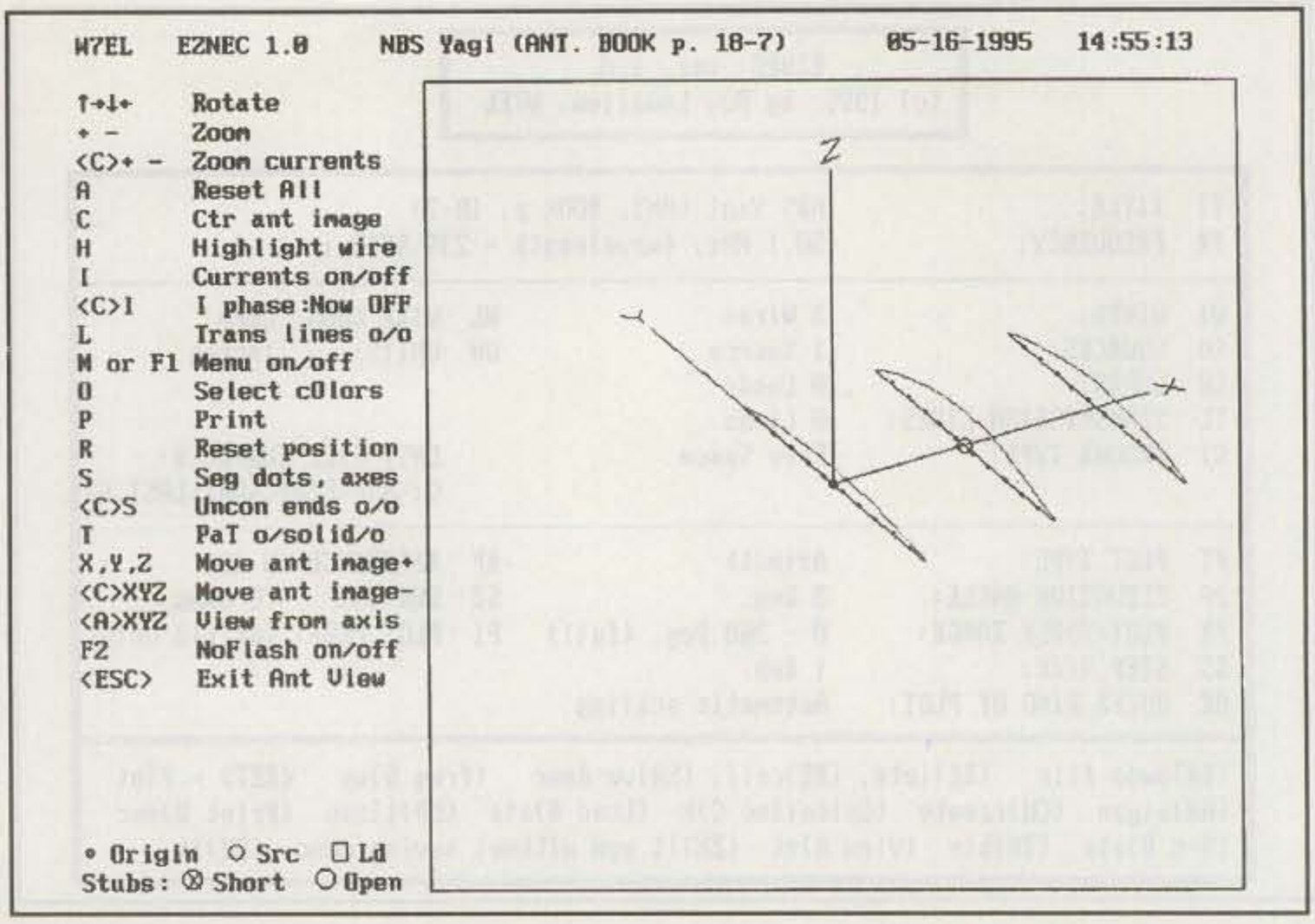


Fig. 3– Here's the NBS Yagi of figs. 1 and 2 you see when you use the EZNEC main menu "View Antenna" selection. The three-dimensional display of the antenna is useful in verifying that you've described the antenna as you intended. Note the many commands and options to change the size, position, and orientation of your view of the antenna.

nearing limits; calculation of transmission line models, including stubs; the ability to accurately measure antennas even with very low wires; automatic segmentation; the full NEC-2 ground model; easy copying of plots to Windows™ documents; color printing; the ability to directly read and use ELNEC antenna descriptions; and several other features to make antenna modeling fast and easy.

The new DOS-based program requires an 80386, 80486, or Pentium processor, at least 2 MB of extended memory, and a minimum of about 2 MB disk space. For more details and specs, contact Roy Lewallen, W7EL, P.O. Box 6658, Beaverton, OR 97007 (503-646-2885). Discount upgrades from ELNEC are available.

Phoenix CD Essentials Update. Using CD-ROMs often is much different than using hard disk-based software, and it can be confusing. Using CD-ROMs on a PC is essentially non-intuitive, and, unlike an audio CD player, with a PC nothing happens when you insert the disc in the drive. In November 1994 we profiled CD Essentials™, a novel Windows utility for CD-ROMs that's designed to make installing and using CD-ROMs fast and automatic.

CD Essentials, as we noted then, is a unique collection of CD-ROM and multimedia utilities. The program (photos E and F) is built around an on-screen "control console" that resembles a high-tech, hand-held, remote control device, complete with LCD display and LED indicator lights. The program effectively learns how you use your discs and automates the steps needed to access, play, control, and manage them.

The program constantly scans your CD-ROM drive, senses when you insert a disc, and provides you with step-by-step prompts on what to do next. The program is designed to load automatically from your Windows Start-Up Group; it remains a small desktop icon until you double-click or place a disc in your drive.

CD Essentials Version 2.0, now available, includes a number of program enhancements. These include a more intuitive interface; up-front options for launching a program or media player; "bubble help" to help you quickly navigate the program's control panel interface; some 39 sound effects keyed to various program buttons; quick-keys to let you quickly eject, remove, and insert CD-ROMs from the keyboard; and a "freebie" copy of IMSI's popular WinDelete™ program for removing (uninstalling) Windows applications' programs and support files.

CD Essentials is $49.95; upgrades are $19.95. It's offered by Phoenix Technologies, Ltd., Eclipse Division, Three First National Plaza, Suite 1616, Chicago, IL 60602 (1-800-452-0120).

Walnut Creek CDROM Update. From the foregoing, it's not hard to see that CD-ROMs are very much in vogue today. You'll find a growing number of CD-ROM publishers and distributors offering their multi-megabyte-stuffed wares, and not just for multimedia-equipped PCs. One such firm is Walnut Creek CDROM, which offers a rapidly growing library of CD-ROM discs of all descriptions.

We first mentioned Walnut Creek CDROM in the October 1992 column, noting that they offered about eight discs at the time. Since then, their library has grown considerably. They now offer well over 50 different CD-ROMs or multiple CD-ROM sets, including the popular QRZ! Ham Radio CD-ROM callsign database.

On a regular basis, Walnut Creek sends me a sampling of their new wares, which are so extensive that I'd never have time to do anything else in life if I perused every single program on each CD-ROM! Some recent titles include a number of "techie" programming language and operating system discs (Linux, Perl, X Windows, Borland Turbo, etc.); the

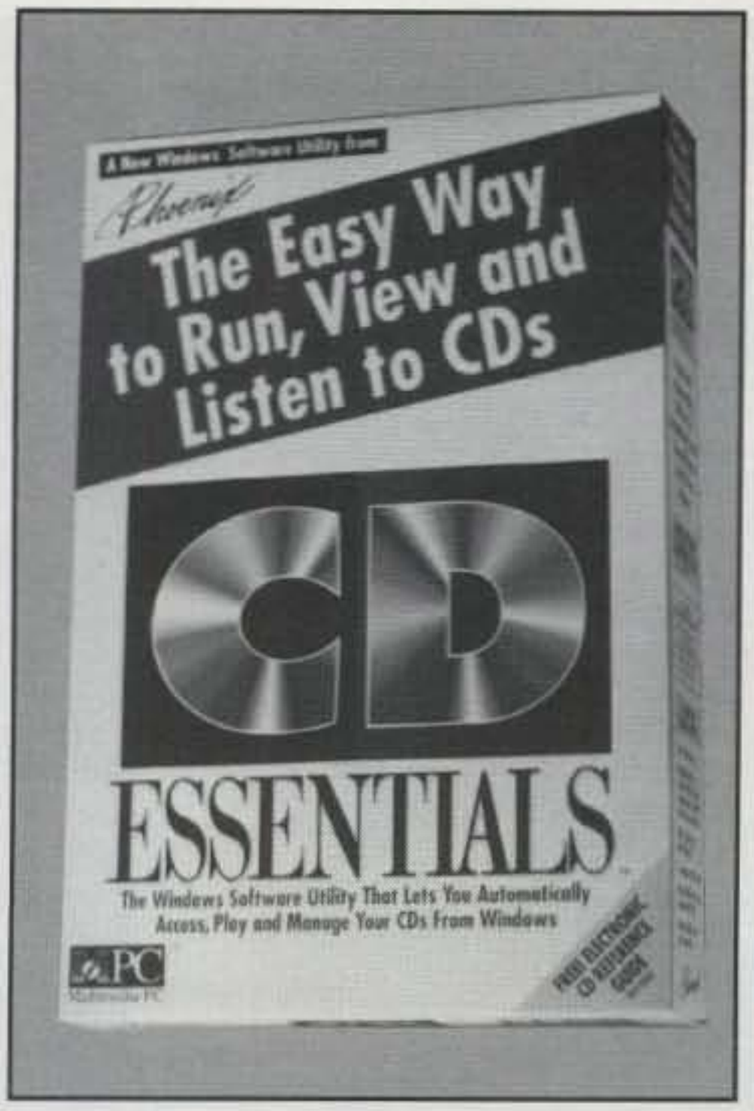


Photo E– CD Essentials Version 2.0 is a collection of CD-ROM and multimedia utilities with several tools to make the process of installing and using CD-ROMs fast and automatic. The program learns how you use your discs and automates the steps needed to access, play, control, and manage them. (Photo courtesy Phoenix Technologies, Ltd.)

complete DOS-based Simtel Software Repository, reportedly the world's busiest Internet site, with some 10,000 MS-DOS shareware programs; a collection of 224 movie clips in QuickTime™ format; 197 novel, CAD-rendered "Awesome Animations"; the Space Shuttle Encyclopedia, a comprehensive collection of information about the NASA Space Shuttle Program; and several more.

Walnut Creek also offers a free "Best of Walnut Creek" sampler CDROM that lets you explore in-depth what they have to offer. The 600 MB freebie includes samples of all their products; index listings of all programs, photos, and files on all their CD-ROMs; lots of program and file samples; and a "digital catalog" and descriptions of their titles. The disc is free, but their regular shipping charge of $5 applies.

For details and a CD-ROM catalog, contact Walnut Creek CD-ROM, 4041 Pike Lane, Suite D-386, Concord, CA 94520 (1-800-786-9907). Or, check out their Internet World Wide Web (WWW) site. It's found at URL (universal resource locator) http://www.cdrom.com/.

Note: Walnut Creek CD-ROM also sells through distributors, some of which offer the discs at a discount. I don't have a list of distributors, but do know that at least two amateur firms are dealers. One is Radio Devices, 32 Queens View Road, Marlboro, MA 01752 (508-480-0502). Another is Radioware Corporation, P.O. Box 1478, Westford, MA 01886-4978 (1-800-950-9273).

Logging Software Rundown. As readers of this column are aware, we cover an exceptionally wide variety of software, in addition to

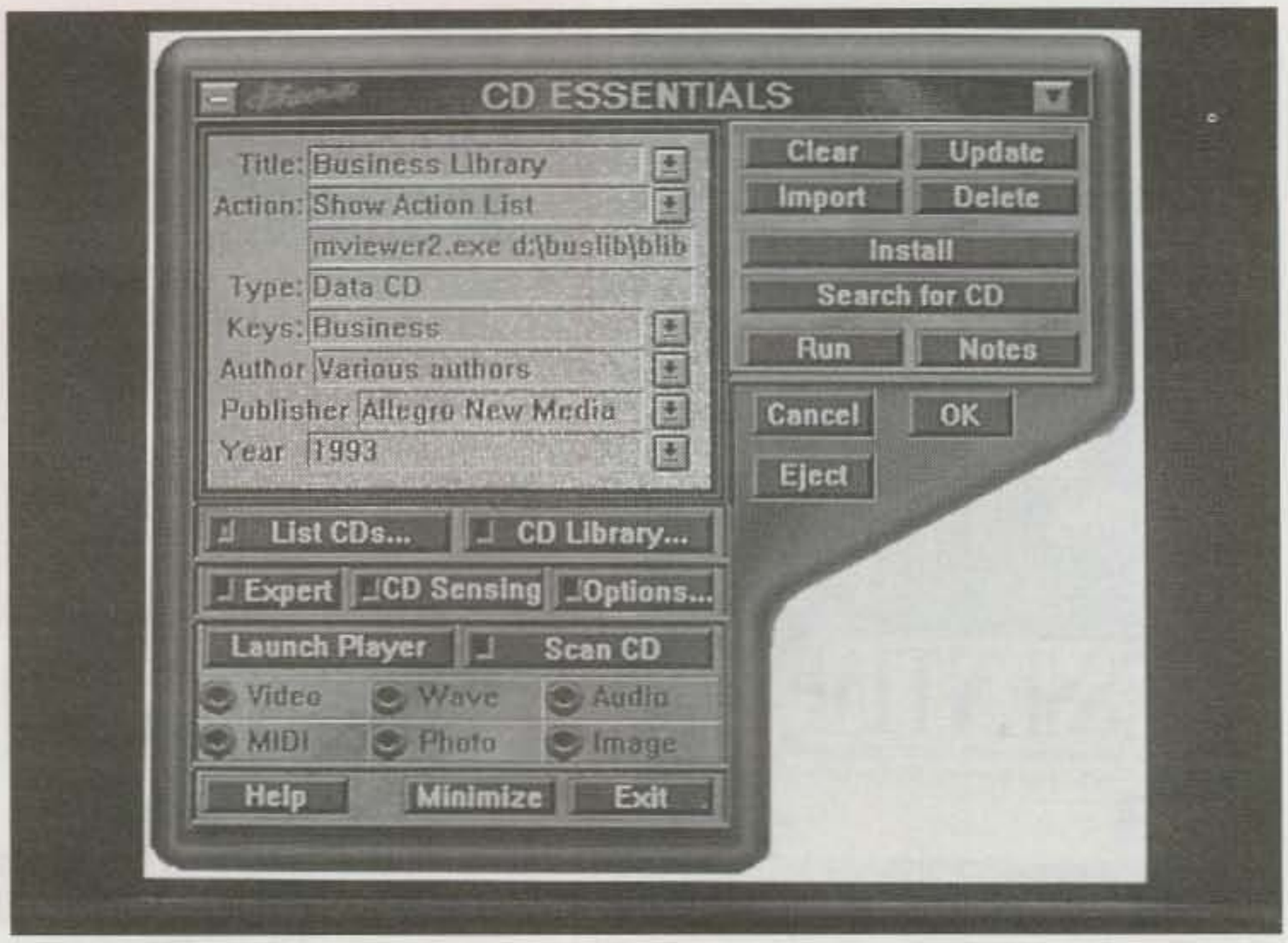


Photo F– The CD Essentials Version 2.0 program is built around an attractive, on-screen "control console" that resembles a high-tech remote-control device. The program constantly scans your CD-ROM drive, senses when you insert a disc, and provides you with step-by-step prompts on what to do next. The program is designed to load automatically from your Windows Start-Up Group. (Photo courtesy Phoenix Technologies, Ltd.)

antenna-related and utility software. Rarely, however, do we have the space or time needed to make detailed comparisons between competing products.

With that in mind, we'd like to draw your attention to a hands-on rundown and product comparison among nine competing logging software products that appeared in May 1995 *QST*. The article is "Let Your PC Do the Logging," by Lauren Rudd, KD8PZ. Besides descriptions of each product, Lauren includes a handy side-by-side comparison chart of eight important features.

Book and Publications Notes

ANTENNA TABLE. A very handy antenna product debuted at the Dayton Hamfest this year. Brian Burke, NØIMD, has developed a spreadsheet that contains antenna lengths for all amateur bands from 160 through 6 meters. He calls it ANTENNA TABLE.

ANTENNA TABLE is a paper-based snapshot of hundreds of high-frequency (HF) and adjacent-band wire antenna calculations. It provides antenna measurements for half-wave dipoles, off-center-fed dipoles, bobtails or half-squares, extended double Zepps (EDZs), full-wave loops, quarter-wave and five-eighths-wave vertical antennas, coax matching stubs, and radials. Application notes and formulas for all of the antennas are included should you want to construct an antenna for Military Affiliated Radio Service (MARS), Civil Air Patrol (CAP), or other use.

While the data are derived from readily-available formulas, and as such are only a starting point for your antenna projects, they are indeed convenient because of their all-in-one-place character. ANTENNA TABLE is $5 from Brian Burke, NØIMD, 1405-C Springfield Dr., Belleville, IL 62221-5739 (618-256-5082).

Wirebook III. This concisely written mini-manual, now in its third edition, is an excellent, how-to-do-it resource for coaxial cable, coax connectors, antenna wire, baluns, lightning protection, grounding, and RF and antenna accessories.

The 60-page *Wirebook III* isn't a documented technical report. Rather, it's a highly readable collection of hints, tips, and advice for the antenna builder and hobbyist. The book is intended as a reference, training aid, and catalog; there are no restrictions on the use of its contents. While primarily for amateurs, the book also is invaluable for SWLs.

The *Wirebook III* is full of useful information gathered by Press Jones, N8UG, "The Wireman," as a consequence of thousands of conversations at hamfests, on the telephone, and from discussions with authors, researchers, tech reps, engineers, and quality-control people. Many readers of this column are aware of The Wireman's marketing of "certified quality" coaxial cable and other wire and cable products by mail-order, at hamfests, and through more than two dozen major dealers.

Press notes that when he offered *Wirebook II* in 1993, he thought 5000 copies would handle the demand. An additional 15,000 copies later, he's finally getting around to updating it to the third edition! We hope that our promotion of the booklet in our column is in some measure responsible for its success.

The *Wirebook III* is $3 from The Wireman, Inc., 261 Pittman Road, Landrum, SC 29356 (1-800-727-9473).

Student's Guide to the Internet. While we don't normally review student books, David Clark's *Student Guide to the Internet* caught our eye. Among the plethora of books on the Internet, this one does a good job of telling you exactly, and in simple terms, how to make good use of the Internet in researching topics.

Written by an experienced Internet user and trainer, it covers e-mail, USENET newsgroups, Web browsers, educational sites, and more. It includes a huge list of Internet resources, listed by subject area so you can find things quickly and easily. Of course, it covers typical college areas of inquiry, including astronomy, art, business, engineering, history, political science, religion, and many other subject areas. Thus it's an excellent book if you have a youngster who's trying to get his or her feet wet on the Internet but doesn't know how to start. It also may be a good book for you if you're *still* confused about the much-hyped cyberspace and the so-called Information Superhighway.

The 350-page Alpha book is $14.99. It's available from Macmillan Computer Publishing USA, 201 West 103rd Street, Indianapolis, IN 46290 (1-800-858-7674); contact them for a free catalog.

Macmillan—like many other computer book publishers—has set up an Internet World Wide Web (WWW) site, called the Macmillan Information SuperLibrary™. It includes a complete online catalog, plus sample chapters and tables of contents for all their books (Que, Sams, Hayden, NRP, Brady, Alpha, and Adobe Press). You also can download software from the MCP library, including files from MCP books, shareware, and demos. Check their Web site at the URL http://www.mcp.com.

1995 Constructor's Hardware Catalog. SESCOM, Inc., offers the 1995 Constructor's Hardware Catalog. The 46-page catalog is a godsend for electronic project builders in that it includes many metal products that are difficult and expensive to obtain today. Included in the catalog are blank rack panels, dual slope cabinets, extruded aluminum boxes, several types of racks and rack boxes, RF shielded steel boxes, tools, metal cabinets, and other "electronics packaging" components.

Two product lines in the catalog are particularly innovative and interesting. One is the RACKEM 'N' STACKEM™ series. This series is a complete selection of boxes, mounting hardware, mini-tabletop racks, wall-mounted racks, and power supplies. The half-rack-size electronic enclosures are designed for equipment in which the device is to be used near the user and where space is at a premium. They are particularly suited to modern surface-mount components.

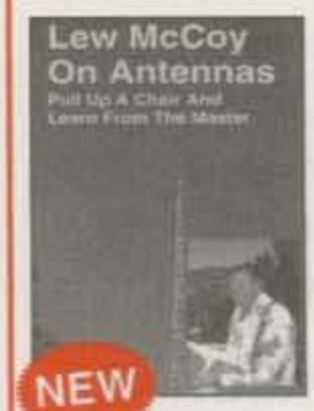
The second is the BOX-IT SYSTEM™, designed for the quick assembly of projects. Practically all possible front and rear panels are available prepunched; this lets assembly become a simple job of mounting parts on the front and rear panels and wiring your circuit to these panels. The system was designed for constructors who don't have the time, tools, and/or knowledge to punch holes and mark panels for their electronic projects.

For a free catalog, contact SESCOM, Inc., 2100 Ward Drive, Henderson, NV 89015-4249 (1-800-634-3457).

Annabooks Catalog of Publications. The Annabooks catalog is full of computer and software technical design information that is of special interest to computer programmers and engineers. The books and software code offered are designed to solve real-world engineering and programming problems. Dozens of titles are available, including ones dealing with ISA and EISA theory and operation, PC keyboard and controller design, flash memo-

CQ BOOK &

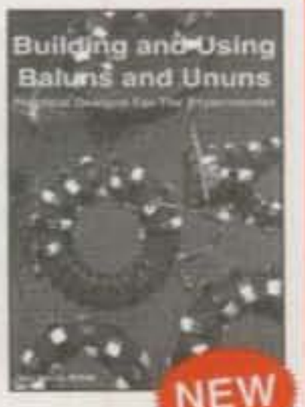
McCoy on Antennas



NEW

CQ magazine author and acclaimed authority on antenna theory and design, Lew McCoy, W1ICP, has written a truly unique antenna book that's a must for every amateur. Unlike many technical publications, Lew presents his invaluable information in a casual, non-intimidating way. **Lew McCoy on Antennas**—It's not just an antenna handbook, but a wealth of practical antenna advice for the ham! **Order No. MCCOY.....$15.95**

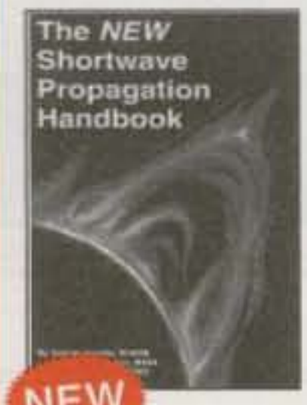
Building and Using Baluns and Ununs



NEW

Written by world-renowned expert Jerry Sevick, W2FMI, this volume is the definitive source for his latest practical information and designs on transmission line transformer theory. W2FMI has unraveled the technological mysteries with designs that are simple and work. Discover new applications for dipoles, yagis, log periodics, beverages, antenna tuners, and countless other examples. **Order No. BALUN.....$19.95**

The NEW Shortwave Propagation Handbook



NEW

The most comprehensive source of information on HF propagation is available from CQ! We've built an award-winning team, gathering information from individuals and organizations around the world. Collectively, co-authors George Jacobs, W3ASK, Ted Cohen, N4XX, and Robert Rose, K6GKU, have devoted much of their professional and amateur careers to advancing ionospheric science. Propagation principles, sunspots, ionospheric predictions, photography, charts and tables galore—it's all in this unique reference volume!
Order No. SWP....$19.95

The Quad Antenna

Hams love antenna books. Written by noted author Bob Haviland, W4MB, **The Quad Antenna** is the authoritative technical book on the design, construction, characteristics and applications of quad antennas. Discover how to easily build a quad antenna for your station that will help you fill your logbook with rare DX that you've only dreamed about before.
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The Packet Radio Operator's Manual

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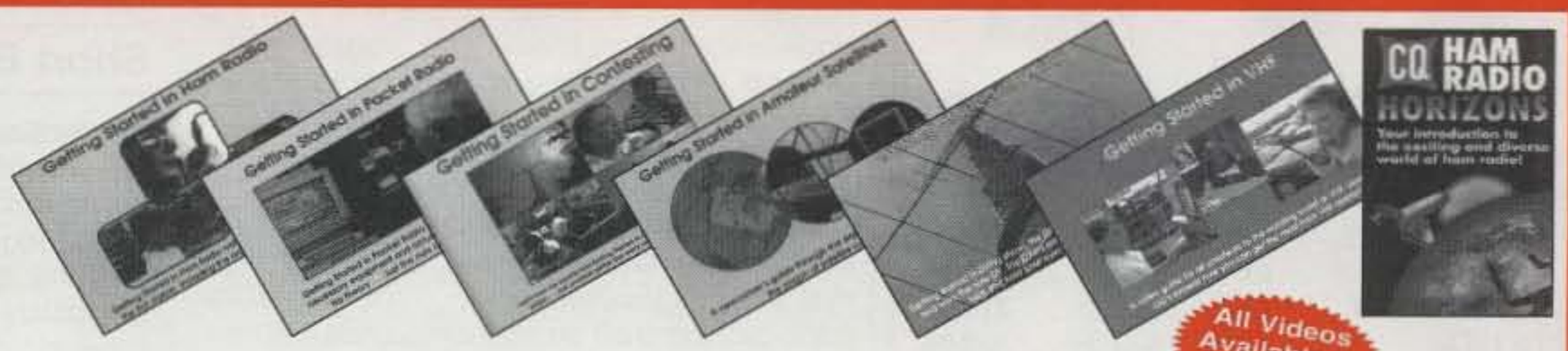

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New Universal Radio Communications Catalog. Universal Radio has issued its periodic update to its illustrated, 8-1/2" × 11" format communications catalog. The new 100+ page catalog is an excellent resource that covers equipment for the amateur, shortwave, and scanner enthusiast. An impressive selection of antennas, headphones, books, and accessories is also featured.

For a copy, contact Universal Radio, Inc., 6830 Americana Parkway, Reynoldsburg, OH 43068 (1-800-431-3939). (The Universal catalog is free by fourth-class mail, or $1 by first-class mail. It's also available outside North America for four IRCs.)

More on Radioware. In a recent column we presented some information from proprietor John Chipman, WA1KYH, on his company and what it offers. John recently passed along an update on the Radioware antenna and antenna accessory product lines that arrived too late to include in that column.

John says he now offers two new types of Davis RF Flex-Weave™ antenna wire. The classic 168-strand Flex-Weave now is available with a clear, flexible, UV-inhibited coating. This new wire is suggested for seashore and marine environments as well as wire antennas that come in contact with tree limbs. There's also a new heavy-duty Flex-Weave, created for longer-span applications requiring a higher-strength wire. The heavy-duty Flex-Weave is 12 gauge using 259 strands of No. 36 bare copper wire.

Also, John notes that he now is able to offer lower prices on RF9914F "Bury-Flex"™ low-loss coaxial cable. The cable, the center of whichis foam-filled with 19 strands of copper wire, provides close to the loss of 9913 cable without moisture problems. The cable construction is a direct burial design with a 100 percent mylar moisture barrier. John also offers several new items of stainless-steel antenna hardware and is now able to offer bulk pricing on several types of connectors.

John advises that he carries several new products from Digital Vision, plus ham-oriented items from Ramsey Electronics, Optoelectronics, and Walnut Creek CDROM. He also offers an operational, receive-only demo version of the Pasokon TV and SSTV Explorer Slow-Scan packages, along with a SSTV Primer booklet, for $2 plus $1 postage. A free catalog of antennas and accessories is available from Radioware Corp., P.O. Box 1478, Westford, MA 01886-4978 (1-800-950-9273).

Letters

A Quick Acknowledgment. We're rapidly running out of space in this month's column, so we'll have to wrap things up shortly. But we would like to acknowledge some of the many folks who have written to your columnist over the past several months. A tip of the hat to Nicholas Hay, K1JZZ; Jim Hagerty, WA1FFL; Enrique Perez, N2FKE; Frank McJannet, K7LQI; Gerald Warner, W7RH; G. A. "Butch" Shira, N4WHB; Daniel Lopez, KB6TOU/AA6JT; Vik Persaud; and Elron Jiongco. We've already responded to these folks personally if replies were needed.

Short Bursts

Correction. In the June issue we ran an update on the W9INN multiband slopers and dipoles, noting that Bill Fanckboner, W9INN, designed the 43 foot, 8-trap Eavesdropper™ receiving antenna. Bill wrote to thank us for the write-up, but pointed out that while he did design the Eavesdropper *dipole* receiving antenna, he didn't design the Eavesdropper *sloper*. He believes that the sloper originally was designed by someone other than Antenna Supermarket or himself. He says he still has the original Eavesdropper dipole hanging up at his QTH, still doing a good job from 560 kHz to 30 MHz feeding an old R-390A receiver. He also notes that his product line now includes over 100 different wire antenna models.

Looking Back Five

Now you know what the column looks like in November 1995. But what were the major topics of discussion in the column of November 1990?

The November 1990 column was entitled "Antennas and Attics—Do They Mix?" There we began with a spirited discussion of indoor HF wire antennas, including some excellent, experience-driven comments from Bill Fanckboner, W9INN. We also discussed WAØTDA's Tice Electronics Flagpole Vertical Antenna, for HF use where antenna limitations are severe. We also covered several antennas and antenna accessories, including Rutland Arrays K1FO-style VHF/UHF Yagis; Trylon Titan™ Towers; the Cushcraft WARC Band Dipole for 12, 17, 30 meters; and the TCE Labs filters.

Software-wise, we examined ECode Systems' HAM-TIME digital clock simulator; the TAJO Communications DXdb© DX tracking program; Quorum Communications' WEFAX PC card scan converter; the 801A Scanning System for the ICOM R7000 communications receiver from 801-SCAN; and updates on NE4L's Morseman Plus Morse Code trainer, W5ODD's LOGGER logging and awards-tracking program, and Central Point Software's PC Tools Deluxe utility package.

If you find a topic we covered in this or a previous column to be of interest, please obtain the back issue directly from *CQ*'s Hicksville, New York office, rather than requesting the article from us. Most back issues are available from *CQ* for $3.50 postpaid. (*CQ* also offers a number of "back issues special" sets to help you complete your collection and other special deals on back issues. Check their ad in this issue, or call them at 1-800-853-9797 to order back issues.)

Wrap-Up

That's all for this time, gang. Next time more Antennas and Accessories topics of current interest. See you then.

Overheard: The trouble with justice these days is that it's just not admissible in a court of law.

73, Karl, W8FX

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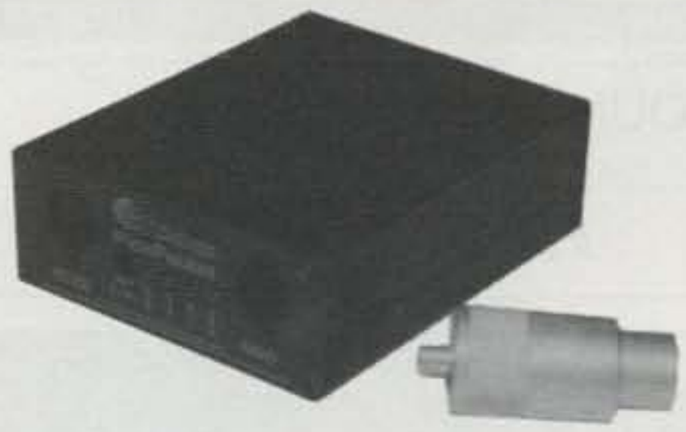

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- PicoPacket Batterypack model with 128k RAM - $209
- PicoPacket Batterypack model with second serial port, 128k, RTC - $249
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- Companion GPS receiver w/active antenna, data cable - $399
- Extra battery pack - $45

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DX

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

Heard Island

A highly talented and experienced group of DXers is aiming at one of the Most Wanted countries in the world this month. Under the leadership of Ralph Fedor, KØIR (the leader of the 3YØPI Peter I Island DXpedition), the team plans to sail from Fremantle on the western side of Australia on November 1, arriving at Heard Island, some 2500 miles to the southwest, around November 12. They will remain on the remote Antarctic island until December 1, and then return to Australia.

Heard Island ranks fourth on the latest *The DX Magazine*'s Most Wanted countries survey, and is the highest ranked country with purely logistical (as opposed to political) obstacles making it rare. This operation should go a long way toward satisfying the demand for Heard.

The 1995 Heard Island DXpedition team includes 3YØPI veterans Bob Scheimder, KK6EK, as Scientific Coordinator, Peter Casier, ON6TT, as European Coordinator, and HB9RHF. Other team members are N6EK, PA3DUU, K5VT, DJ9ZB, and JH4RHF—truly an all-star DXpedition team!

The crew has chartered a 140 foot vessel for the trip and has all the permits, environmental assessments, and other paperwork in hand. They will operate on all bands and modes, including digital modes and the amateur satellites. They will build off the strong points of the 3YØPI DXpedition, and hope to take advantage of some of the technical innovations tested in the XRØY/XRØZ DXpedition. *(See last month's DX column for more on the state-of-the-art Easter Island/Salas y Gomez operation.)*

Heard Island is one of the most isolated places on the globe, with only Kerguelen FT–X nearby. At 53 degrees south, it lies in the middle of the "freezing fifties" latitudes, and is known for its terrible weather. At 73 degrees east longitude, it is due south of India, and is antipodal to Canada. This places it more than 10,000 miles from any DXers in the US, which will mean short, weak openings. Further, both the short and long paths between Heard Island and the US pass through high latitudes, making them vulnerable to ionospheric disturbances. Stateside DXers will have to work hard to make contacts.

MiniProp Plus suggests West Coast DXers look for the 1995 Heard Island DXpedition on 40 meters around 1400–1500Z (just before local sunrise), and 20 meters right at sunrise—1500Z. The best band appears to be 30 meters, with a significant opening running 1100–1520Z, again peaking at local sunrise. The East Coast will enjoy a significant advantage in working Heard Island. DXers there can look for Heard on 80 meters from 2200–0000Z, 40 meters from 2100–0100Z, 30 meters from 2030–0230Z, and 20 meters from 1830–2230Z. Forty meters offers the best signal strengths. Stations in the middle of the country will be the worst off, with only a short opening on 30 meters around 0100Z and relatively rare, weak openings on 20 meters from 2300–0500Z. Sunrise on Heard Island in mid-November is around 2300Z, and sunset is at 1445Z. Especially on the West Coast, but from other locations as well, look for best signal strengths at other than the direct beam heading. The 1983 Heard Island Expedition team (see below) reported much skew-path propagation.

Jim Smith, VK9NS, operating as VKØJS from Heard Island.

While on the island, the DXpeditioners will have their share of potential problems. The mean temperature will hover around 35 degrees F, with expected highs around 40 degrees. The prevailing westerly winds blow at an average speed of 20 knots, and it will rain, sleet, or snow two out of every three days. Visibility will be low thanks to fog and low clouds. The DXpeditioners will be lucky to get a clear view of Big Ben, the volcano that dominates the island.

The island is about 25 miles long and 13 miles wide, with ice and glaciers covering the island most of the year. Atlas Cove on the northeast side offers the best anchorage, and the relatively level area around Atlas Cove is the most likely site of the DXpedition.

Heard Island was spotted by two hunters in

Jim's wife, Kirsti, VK9NL, used the callsign VKØNL from Heard.

P.O. Box 50, Fulton, CA 95439

the first half of the 19th century, but its existence was not published until 1853, when Captain Heard of the American vessel *Orienta* logged the island on a voyage to Melbourne. In 1855 Captain Darwin Rogers of the *Corinthian* was the first person to land on the island, and he was the first to exploit the island's large population of elephant seals for their oil. Over the next few years American and Australian vessels slaughtered nearly all the elephant seals for their oil. By 1880 so few seals remained that the sealers abandoned the island.

The island was then largely ignored for many years, except for an occasional exploration or "flag raising" to maintain the British claim to the island. In late 1947 the Australian National Antarctic Research Expedition (ANARE) set up a research station at Atlas Cove. The base was staffed until 1955. Since that time the only persons with any interest in Heard Island were some mountaineers looking for the challenge of climbing 9000 foot high Big Ben, an occasional scientific or flag-raising party, and, of course, amateur radio DXpeditioners.

Heard Island's amateur radio history began in 1947. Alan Drury, VK3ACD, was a member of the first ANARE team and spent 15 months on the island, until early 1949. There were other radio operators at the ANARE base over the next few years, but once the base closed in 1955, contacts with Heard became scarce. **VKØNL** was active in 1963, when an ANARE team attempted to climb Big Ben. (They were not successful.)

The next accepted amateur radio operation was **VK2ADY/VKØ** in 1966–67 by Don Miller, W9WNV. (While DXCC credit was denied for some of Miller's operations, his Heard Island operation was not one of them.) In 1969–70 an American team wintered on Heard, and W7ZFY and WB4HWP operated as **VKØWR**, making some 3200 contacts, mostly on 20 meters. WA6EAM was a member of the 1970 relief team, and he operated as **VKØHM**. There were a few minor operations over the next 10 years, but few contacts.

Then in 1980 Bob McManmon, Radio Officer of the *Cape Pillar*, which spent considerable time at Heard Island, attempted to operate as VKØRM, but his radio died after only a few contacts. By 1982 Heard had risen to the second Most Wanted country in the world.

As the #2 Most Wanted country, Heard attracted the attention of many groups of DXpeditioners. Jim Smith, VK9NS, was the most vocal of these, and he spent much of the time between the failure of the 1980 operation and 1983 trying to drum up support for a major DXpedition to Heard. The on-again, off-again nature of his efforts cast doubts on whether he could actually organize and execute such an enormous undertaking, and financial support was weak. Smith went so far as to establish the Heard Island DX Association (HIDXA) to raise money for the operation.

Smith continued his efforts to find a suitable vessel, and finally located a (supposedly) refurbished whale chaser in Hobart, on the island of Tasmania, an additional 1000 miles from Heard. As he stepped up his fund-raising efforts, another opportunity to go to Heard arose.

A group of Australian mountaineers wanted to be the second team to ever reach the peak of Big Ben. They proposed a largely climbing-oriented voyage to the island, with a six-week stay while they tackled the ice-covered mountain. Some DXers in western Australia con-

The WAZ Program

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262 ..... N4TO

17 Meter CW

16 ..... N4MHQ

20 Meter CW

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183 ..... HA8LKE

160 Meters

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80 SM5EDX—New, 40 zones

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95 ..... SP3BGD

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4290	EA3NB	4293	I2PQW
4291	AI8W		

CW/Phone

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7607	N2BYM	7610	KE4WI
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cluded that a few DXers could go along and operate while the climbers did their thing. Suddenly, after being almost completely off the air for years, not one, but two separate teams were gearing up for Heard!

In most instances of this type in DX, one team either joins up with the other or folds its tents and goes home, looking elsewhere for another challenge. In 1983 neither group gave up, and DXers had two separate Heard Island DXpeditions on the air at the same time!

The two teams took very different approaches to the daunting task of getting from Australia to Heard, and safely back, through some of the most storm-swept seas anywhere. The Heard Island Expedition (the climbers) chartered an 84 foot yacht with a proven record of long-distance sailing. The *Anaconda II* had recently returned to Australia after participating in the Sydney to Rio de Janeiro Yacht Race, through similar waters to those on the way to Heard. The HIDXA's choice was the ex-whaler which hadn't spent a night at sea since its (supposed) refurbishing. It should have been an ominous warning that one of the *Cheynes II*'s two sister ships was sunk to provide a fishing reef and the other was dry-docked as part of a museum exhibit. In fact, *Cheynes II* was once owned

Hideko Nishida, JH4NPP, operated from Sarawak as 9M8HN a couple of months earlier this year, and she plans to return. Try 18080 kHz at 0900–1100Z.

The WPX Program

SSB

2530	KB5OHT	2533	IN3PBY
2531	EA7CRL	2534	IKØVPE
2532	DU1SAN		

CW

2887	PY7OJ	2888	IK1GPG

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1714	PA3AEB	1716	5NØETP
1715	EA3CYM		

VPX

282 ..... JA1-9894

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CW: 500 YU1JU. 550 YU1JU. 700 WA3GNW. 800 K2LUQ. 1000 KC6X. 1050 W9IAL. 1150 JG2LGM. 1200 KS3F. 1250 W4TYU, KS3F. 1300 KS3F. 1600 I5RFD. 1650 HP1AC. 1700 HP1AC. 2150 W8IQ.

10 Meters:	LU5EWO, IK1GPG, IK2PZG
15 Meters:	LU5EWO, IK1GPG, IK2PZG
20 Meters:	LU5EWO, IK1GPG, IK2PZG
40 Meters:	HA9PP, IK1GPG, HB9BYY, IK2PZG
80 Meters:	IK1GPG, HB9BH, IN3QCI
160 Meters:	IK1GPG, IN3QCI

Asia:	PA3AEB, HA1CW, IK1GPG, IK2PZG
Africa:	IK1GPG, 5NØETP, IK2PZG
No. Amer.:	PA3AEB, HA1CW, LU5EWO, IK1GPG, 5NØETP, IK2PZG
So. Amer.:	LU5EWO, IK1GPG, IK2PZG
Europe:	PA3AEB, HA1CW, IK1GPG, 5NØETP, IK2PZG
Oceania:	IK1GPG, IK2PZG

Award of Excellence With 160 meter endorsement: IK1GPG.

Award of Excellence Plaque Holders: I8YRK, W4CRW, SMØAJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, W4BQY, IØJX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, HI8LC, KA5W, KØJN, W4VQ, KF2O, K3UA, HA8XX, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR, WB8ZRL, SM3EVR, CT1FL, K2SHZ, UP1BZZ, W8RSW, WA4QMQ, EA7OH, K2POF, DJ4XA, IT9TQH, W8ILC, K2POA, N6JV, W2HG, ONL-4003, VE7DP, K9BG, W5AWT, KBØG, HB9CSA, F6BVB, W1BWS, YU7SF, G4BUE, N3ED, DF1SD, K7CU, I1POR, LU3YL/W4, NN4Q, KA3A, YBØTK, VE7WJ, VE7IG, K9QRF, YU2NA, N2AC, W4UW, NXØI, W9NUF, N4NX, SMØDJZ, DK5AD, WB4RUA, DK5AD, WD9IIC, W3ARK, I6DQE, LA7JO, VK4SS, K6JG, I1EEW, I8RFD, I3CRW, VEFXR, N4MM, KC7EM, ZS6BCR, CT1YH, IV3PVD, KA5RNH, ZP5JCY, F1HWB, KC8PG, NE4F, VE3MS, K9LJN, ZS6EZ, YU2AA, I1WXY, IK2ILH, DEØDAQ, LU1DOW, N1IR, IK4GME, WX3N, KC6X, N6IBP, W5ODD, IØRIZ, I2MQP, I5ZJK, JAØSU, S51NU, K9XR, WØULU, HB9DDZ, F6HMJ, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, KØIFL, IN3NJB, WT3W, IN3NJB, S50A, UT5-186-2.

Award of Excellence Plaque Holders with 160 Meter Endorsement: CT1YH, IV3PVE, KA5RNH, ZP5JCY, AB9O, FM5WD, SMØDJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, HI8LC, KA5W, UR2QD, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SMØAJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, KBØG, F6BVB, W4BQY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE, I2UIY, YBØTK, W8ILC, W1BWS, VE7WJ, K9QFR, NN4Q, W4UW, NXØI, G4BUE, LU3YL/W4, I4EAT, WB4RUA, VE7WJ, N4NX, DEØDXM, VE7IG, K9BG, I1EEW, AB9O, CT1YH, IV3PVD, KA5RNH, ZP5JCV, I2MQP, IØRIZ, W5ODD, WX3N, IK4GME, HA8XX, YU1AB, F6HMJ, HB9DDZ, K9XR, KØJN, ZS6EZ, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, K9LJN, WT3W, IN3NJB, S50A, UT5-186-2.

Complete rules and application forms may be obtained by sending a business-size self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to: "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101-9511 USA.

5 Band WAZ

As of July 31, 1995, 423 stations have attained the 200 Zone level.

New recipients of 5 Band WAZ Award with all 200 Zones confirmed:

None

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)	KL7Y, 199 (34)
AA4KT, 199 (26)	RA3AUU, 199 (1)
K7UR, 199 (34)	UY5XE, 199 (27)
NAØY, 199 (26)	SM6AHS, 198 (12, 31)
WØPGI, 199 (26)	UA3AGW, 198 (1, 12)
W2YY, 199 (26)	VO1FB, 198 (19, 27)
W9WAQ, 199 (26)	EA5BCK, 198 (27, 39)
W1JR, 199 (23)	KZ4V, 198 (22, 26)
VE7AHA, 199 (34)	K4PI, 198 (23, 26)
W1FZ, 199 (26)	G3KDB, 198 (1, 12)
IK2GNW, 199 (1)	DK2GZ, 198 (1, 24)
W9CH, 199 (26)	KG9N, 198 (18, 22)
ACØM, 199 (34)	KM2P, 198 (22, 26)
IK8BQE, 199 (31)	I1ZXT, 198 (1, 1 on 40)
JA2IVK,199(34,40m)	GM3YOR, 198 (12, 31)
KA5W, 199 (26)	OE6MKG, 198 (12, 31)
K1ST, 199 (26)	NN7X, 198 (17, 34)
ABØP, 199 (23)	DKØEE, 198 (19,31)

The following have qualified for the basic 5 Band WAZ Award:

I6XGZ, 179 Zones
US1IDX, 175 Zones

Endorsements:

OH2DW, 196 Zones	DJ4GJ, 190 Zones
UY5XE, 199 Zones	

974 Stations have attained the 150 Zone level as of July 31, 1995.

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

by a museum, but was sold to a salvage company when they couldn't raise funds to make the ship presentable.

As 1982 wore on, DXers around the world monitored the Race for Heard Island. The Heard Island Expedition picked February 1983, as that is the warmest month of the year at Heard. February 1 was their target date to arrive at Heard. Smith figured he could get a leg up on the other group by arriving two weeks earlier, and aimed his arrival for January 16, leaving as the Expedition crew arrived. It didn't work out that way.

Smith's choice of vessel turned out to be a complete disaster. From the first moments of the trip, his HIDXA DXpedition was one problem after another. As soon as the ship left the safety of the River Derwert, a gale sprang up and the *Cheynes II* had to turn about and head back into Hobart. It wasn't the leaky skylights or the holes in the decking, but high fuel consumption that forced the failure of this first attempt to reach Heard. (Neither fuel capacity nor consumption were as advertised.)

The ship was billed as having a top speed of 10 knots at a fuel use of four tons a day. However, the first day they reached a speed of only three knots, and fuel usage ballooned

CIRCLE 22 ON READER SERVICE CARD

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. Deleted countries do not count and are dropped from listing as they occur. Currently there are 326 countries. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be made at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement. All updates must be accompanied by an SASE for confirmation. The fee for endorsement involving the issuance of a sticker is $1.00.

CW

K2TQC	326	KD8V	326	F3TH	326	WØHZ	324	ON4QX	321	KA5TQF	316	OH3NM	310	WA4DAN	301	LA7JO	289
K1MEM	326	9A2AA	326	IT9TQH	326	N7MC	324	K9QVB	321	VE7CNE	316	K4CXY	309	HA5NK	301	YU1AB	288
W9DWQ	326	N4KG	326	N5FW	326	WØJLC	324	W8XD	321	W3BBL	315	VE7DX	309	WG5G/QRPp	301	DJ1YH	288
N4MM	326	OK1MP	326	N6AR	325	N7RO	324	HA5DA	321	N4AH	315	K4JLD	309	W6YQ	301	KE5PO	286
K2FL	326	WØIZ	326	K8NA	325	W7ULC	323	DJ2PJ	320	IK2ILH	315	I1EEW	307	KA2DIV	300	KH6CF	284
DL1PM	326	PAØXPQ	326	WA4IUM	325	WØSR	323	IT9ZGY	320	K2JF	314	N1HN	307	YU1TR	300	F6HMJ	284
K3UA	326	W2FXA	326	KZ4V	325	WA4JTI	323	K1HDO	320	AA2X	314	N3DQN	306	YU2TW	299	KF5PE	282
K9BWQ	326	SM6CST	326	KB8DB	325	W4OEL	323	KB4HU	320	4N7ZZ	314	WB4UBD	305	YV5ANT	299	K7EHI	280
K9MM	326	N4JF	326	WA8DXA	325	AG9S	322	K4XO	319	W5OG	313	I4LCK	305	WA8YTM	298	HB9AFI	278
K2ENT	326	W2UE	326	EA2IA	325	W7CNL	322	VE3HO	319	N5FG	313	N5HB	304	CT1YH	298	W4UW	277
K2OWE	326	W9WAQ	326	I1JQJ	325	K4IQJ	322	WB5MTV	318	KA7T	313	OZ5UR	304	HB9DDZ	297	W3HQU	276
K4CEB	326	AA4KT	326	K8LJG	324	NC9T	322	N6AV	318	K2JLA	312	WB4DBB	304	N4OT	296	WF9K	276
I4EAT	326	K9IW	326	IT9QDS	324	DL3DXX	322	AA6AA	318	K9DDO	312	G2FFO	303	W7IIT	296	G4MVA	275
K6JG	326	YU1HA	326	W6DN	324	W1WAI	321	KUØS	317	K1VHS	311	VE9RJ	303	KØHQW	294	YU7FW	275
K6LEB	326	I5XIM	326	G4BWP	324	AA5NK	321	N6CW	316	G3KMQ	311	WB6OKK	303	KB3X	289		

SSB

K4MZU	326	DL9OH	326	W7OM	326	OA4ED	325	N2VW	322	N5ORT	318	ZS6BBY	311	KD4YT	302	NM5O	285
K2TQC	326	KSØZ	326	WD8PUG	326	KC8EU	324	TI2JJP	322	XE1ZLW	318	WA9IVU	311	RA2YA	301	CT1YH	285
K2FL	326	W6EUF	326	W2CC	326	N4KEL/M	324	WB4DBB	322	EA8TE	318	K3NEE	311	W2LZX	301	EA1AYN	285
W9DWQ	326	OE3WWB	326	K2JLA	326	IK8BQE	324	W5XQ	321	K1UO	318	IN3ANE	311	XE2DU	301	EA3BT	285
W9SS	326	W2FXA	326	VE2WY	326	W3GG	324	KA5TQF	321	KF5AR	318	F1OZF	311	VE6PW	301	N8BJQ	284
WA4IUM	326	SM6CST	326	WB4UBD	326	AA5NK	324	WA3HUP	321	I8IYW	318	EI6FR	311	AB4NS	301	KJ5LJ	284
DJ9ZB	326	K6YRA	326	IT9TGO	326	K2JF	324	TI2HP	321	NI5D	318	IØSGF	311	WP4AFA	300	CT1BWW	284
WB1DQC	326	N4KG	326	AA4KT	326	WB5TED	324	I8XTX	321	KU9I	318	KA5RNH	310	WA5SUE	300	VE3IMO	283
XE1AE	326	K3UA	326	PT2TF	326	WZ4I	324	I8YRK	321	KF8VW	318	I2MQP	310	YU2TW	300	XE1ILI	283
EA2IA	326	OK1MP	326	WB3DNA	326	W2FGY	324	K4PQV	321	WB6PSY	317	N5HSF	310	WT4T	300	EA3CWK	283
K2ENT	326	W6DN	326	KE4VU	326	WØSR	324	KS2I	321	WB3CQN	317	HA6NF	310	W7KSK	300	KE6CF	283
OZ5EV	326	I2QMU	326	KM2P	326	YV1CLM	324	OA4OS	321	9H4G	317	WA2FKF	310	VE3FJE	300	YC3OSE	282
KA3HXO	326	PAØXPQ	326	ZL1HY	326	YV5CWO	324	W7ULC	321	WA6DTG	317	W3SOH	309	AB4UF	300	YV1JV	282
CX4HS	326	N4JF	326	N5FW	326	W5LLU	324	W3AZD	321	PY2DBU	317	CT1EEB	309	WB4UHN	300	VE4MT	282
F9RM	326	KB4HU	326	I1EEW	326	I8KCI	324	WØULU	321	XE1XM	316	EA5RJ	309	KB8NTY	300	WAØQII	281
I4EAT	326	KC4MJ	326	K9HDZ	326	I1POR	324	VE7WJ	320	W8AXI	316	XE1MD	308	I2ZGC	299	VU2DVP	281
KB8DB	326	OE2EGL	326	W9OKL	326	VE4AT	324	IØAMU	320	W6SHY	316	I4CSP	308	NW5K	299	LU6FAZ	281
VE3XN	326	SV1ADG	326	W6BCQ	326	DU9RG	324	K4CXY	320	KV2S	315	CT1AHU	308	WB6GFJ	299	KB5MRT	281
YU1AB	326	CX1TE	326	LA7JO	326	KD5ZM	324	G4ADD	320	WA9RCQ	315	N6RJY	308	VE3CKP	299	WN6J	281
VE1YX	326	K5OVC	326	VE7DX	326	W7FP	324	I4WZK	320	KB8O	315	AB4IQ	307	EA3CB	299	N9KAE	281
N4MM	326	W4UNP	326	AA6BB	325	K8YVI	323	I4SAT	320	N3ARK	315	N6AV	306	DK5WQ	299	NXØI	280
N7RO	326	TI2CC	326	K5TVC	325	NC9T	323	I8LEL	320	KA4RAW	315	WD5P	306	KQ4GC	298	YU1TR	280
YS1GMV	326	WA4ECA	326	I8ACB	325	KB7VD	323	K4JLD	320	KE3A	315	TI2TEB	306	KJ9N	298	KK4TR	280
K9MM	326	IØZV	326	N6AR	325	KE5PO	323	WE2L	320	K2AJY	315	VE3DLR	306	VE3XO	294	WN5K	279
4Z4DX	326	I4LCK	326	WD8MGQ	325	K9HQM	323	EA3EQT	320	KX5V	315	W3YEY	306	KB5WQ	294	KAØZFX	279
ZL1AGO	326	K7EHI	326	K8LJG	325	KC5P	323	WS9V	319	K7TCL	315	KF8UN	306	IT9VDQ	293	KQ4WD	279
KF7SH	326	IKØIOL	326	K8NA	325	WDØGML	323	ON5KL	319	IK7DBB	314	OA4QV	306	AA2FN	293	HA5NK	279
ZS6LW	326	K2JLA	326	IK8CNT	325	WW1N	323	WA4DAN	319	AB7AU	314	WA8YTM	306	TI2LTA	292	WØIKD	279
VK4LC	326	IT9TGO	326	AI8M	325	KØHQW	323	AA6AA	319	NØAMI	314	XE1MDX	305	K2EEK	291	VE7HAM	279
YV5AIP	326	ZL1HY	326	W4UW	325	WB2JZK	323	KI3L	319	OE6CLD	314	VK3JF	305	N6ITW	291	N5QDE	279
ZL3NS	326	XE1L	326	WB6OKK	325	CE7ZK	323	VE3HO	319	OH5KL	313	W6SHY	305	YB1RED	291	WZ3E	279
K9IW	326	YU1HA	326	VE2PJ	325	K2ARO	323	XE1MD	319	WDØDMN	313	DL3DXX	305	DJ2UU	291	VU2CVP	278
K6JG	326	VE3MR	326	I8LEL	325	LU7HJM	323	KB1JU	319	F6BFI	313	NU4Y	305	WA3KKO	290	EA3CWT	278
WA6OET	326	VE3MRS	326	K7LAY	325	KA9I	323	OE7SEL	319	W5GVP	313	EA5OL	305	OE7KWT	290	N6CFQ	278
WA4JTI	326	W4NKI	326	PY4OY	325	4N7ZZ	323	WDØBNC	319	N6PTI	313	K3LUE	304	I4UFH	289	K4BYK	277
YV1AJ	326	KZ4V	326	W6BCQ	325	WN5IJZ	322	WA5HWB	319	KD9CN	313	WF9K	304	EA5GKE	289	WN5MBS	277
YV1KZ	326	VE3GMT	326	WØSFU	325	YV5IVB	322	VE2GHZ	319	K1VHS	313	G4NXG/M	304	IK2PZG	289	VE2DRN	277
N6AHU	326	K9BWQ	326	IT9ZGY	325	K4SBH	322	K9QVB	318	EA2AOM	313	KJ6HO	304	KF7VC	288	GØLRX	277
EA4DO	326	WØYDB	326	IT9TQH	325	XE1CI	322	KB5FU	318	W1LQQ	312	WB2NQT	303	KG6LF	288	KC6AWX	276
W9OKL	326	OZ3SK	326	K6LEB	325	WB4PUD	322	AA4AH	318	K4LR	312	WA1DHM	303	TI5RLI	287	NX4Y	275
9A2AA	326	W4EEE	326	K8CSG	325	LZ1HA	322	G4GED	318	I8INW	312	K4JDJ	303	OK1AWZ	287	NC3C	275
KD8V	326	KE4VU	326	I2EOW	325	N5FG	322	W6NLG	318	ZL1BOQ	312	WA9BDX	302	4X6DK	287	F5NBX	275
DL6KG	326	AG9S	326	IK1GPG	325	ZS6AOO	322	IK8GCS	318	K8CMO	311	KD5ZD	302	IK2DUW	287	VE2AJT	275
KZ2P	326	WA4WTG	326	I1JQJ	325	K1HDO	322	W6MFC	318	K8NWD	311	WA8MEM	302	IK8BMW	286		

RTTY

K2ENT	317	WB4UBD	291	I1JQJ	273	K3UA	271	KE5PO	254	NI4H	252	W4EEU	250	KB8DB	242	G4BWP	222

to ten tons a day! At that rate, they couldn't carry enough fuel to get to Heard and back.

The *Cheynes II* tied up for repairs and the days began to drag on. It wasn't until six days after the initial departure that the ship was ready to sail again. However, at the scheduled departure time the HIDXA DXpeditioners noticed the captain (and owner) of the ship was unloading his personal effects from the ship. The captain announced he was not going to Heard and he had hired another captain, who would be flying in from Perth later that day.

A couple of days out of port the new captain announced that they were turning around and sailing back to Hobart! He calculated the fuel usage since the repairs, and determined that they still couldn't carry enough fuel to get to Heard and return. The DXpedition appeared to be cancelled. However, some of the non-amateur members of the HIDXA were able to raise some additional funds, and could pay for the extra fuel needed for the trip. The group detoured to Albany at the southwest tip of Australia for refueling. This lengthened the trip considerably, and put the DXpedition further behind schedule.

Even when the ship finally set sail for Heard, the problems were far from over. About ten days out of Albany, in the middle of the Indian Ocean, the new skipper announced that they did not have enough fresh water to get to Heard and back. (The ship's steam engines required five tons of fresh water a day.) This forced yet another detour (and delay). The group had to sail to Kerguelen Island, nearly 300 miles north of Heard, and hope they could spare the needed fresh water. Fortunately, they were able to obtain the 80 tons of water, but as they prepared to cast off for Heard, the captain said that they didn't have enough fuel to make it to Heard and back to Albany, due to the detour to Kerguelen! He recommended going straight back to Australia, abandoning the attempt to reach Heard.

After considerable discussion, the captain reluctantly agreed to go to Heard as planned, and then meet up with another ship coming out of Albany to be refueled at sea. That turned out to be yet another bad decision.

Because of all the problems with the ship, the HIDXA was far behind their initial sched-

ule. In fact, the *Anaconda II* had arrived at Heard on January 21, 1983, well ahead of their original schedule, and the two remaining amateurs on the team were on the air two days later. (The scheduled third amateur had to cancel at the last minute.) David Shaw, VK3DHF, operated as **VKØHI,** and Alan Fisher, K8CW, who had gotten married only a month before leaving for Heard, handled the CW pile-ups as **VKØCW**. Despite poor propagation, the operators logged about 1000 QSOs a day.

Meanwhile, the HIDXA team finally arrived on Heard on Febuary 6, three weeks behind their initial predictions. They erected their stations a short way down the beach from the other group and fired up as **VKØJS** and **VKØNL**. For a few days in February 1983 there were two separate DXpeditions on Heard Island at the same time, a unique moment in DX!

Due to the earlier arrival of the Heard Island Expedition group and lousy propagation, the HIDXA didn't even come close to their pre-DXpedition goal of 40,000 contacts. In fact, by the time deteriorating weather and diminishing supplies forced the team to leave ten days later, they had made only 14,000 contacts, less than half the number the other team made. And their troubles were not over. In fact, they had only just begun!

Vince Thompson, K5VT (right), is a member of the 1995 Heard Island DXpedition team. With Vince is Dick Ehrhorn, W4ETO, at the New Orleans International DX Convention last year.

A storm forced the *Cheynes II* to haul anchor and sail away from Heard. In the process, they lost the aluminum dinghy used to ferry DXpeditioners and equipment between the ship and shore. (The engine on their main boat for this purpose seized up and couldn't be repaired, so this was the team's only means of getting the DXpeditioners off the island.) Fortunately, the *Anaconda II* had returned to pick up the other team, and loaned their inflatable Zodiacs to the HIDXA team. Both groups left Heard Island at about the same time on February 16.

While the *Anaconda II* had an uneventful sail back to Australia, the same cannot be said for the ill-fated *Cheynes II*. With fuel supplies critically low, the captain elected to turn off the engines and take advantage of the prevailing westerly winds by *sailing* back to Australia. Rigging makeshift tarps on the cargo cranes, the HIDXA DXpeditioners faced a long, rough ride back home. The ship could make only 50–100 miles a day, depending on the winds, and they were more than 1500 miles from Australia! Finally, a few hundred miles off the Australia coast, the owner of the *Cheynes II* met them with another aging rust-bucket and took them in tow for the final leg into Albany.

The HIDXA crew took a month to limp home from Heard under sail and tow. The entire round trip took 72 days, more than twice as

QSL INFORMATION

1C0ZZ to UU6JF/RB4JF
1P0P to DK8KW
3A2RPR to 3A2LZ
3D2EK to N6EK
3D2LF to AA6BB
3F3C to HP2CWB
3Z4EAK to SP4EAK
3Z4JWR to SP4JWR
4L7Z to UU6JF/RB4JF
4S7DA to W3HNK
4U/RW3AH to RW3AH
4X1VF to K1FJ
5H3MZ to 5Z4YQ
5T6E to F6FNU
5X1F to WA1ECA
6V1A to 6W6JX
8P9FB to AB6QM
8P9FI to KD6OHJ
9A4A to 9A4AA
9H5BVE to 9H1ARC
9K2MU to WA4JTK
9X/VE9OM to VE9OM
9X1A to ON5NT
AA4VK/CY9 to WA4DAN
AH8N to KH8BB
AP2JZB to K2EWB
AX2ITU to VK2PS
BS7H to JA1BK
C47A to 9A2AJ
C4MI to 5B4KH
C6AFP to N4JQQ
C6AGH to KA1DIG
CN5I to I5JHW
CS4PV to CT1EIF
CS8B to CT1EEB
CU9B to CU3AV
CY9/K4TVE to WA4DAN
CY9/KW2P to WA4DAN
CY9/W5IJU to WA4DAN
D2SA to F6FNU
D2TT to ON5NT
D3T to ON5NT
DS0DX/2 to HL1XP
DU97RG to DU9RG
ED1SLG to EA1CA
ED80R to OH0XX/DU1
EO50BA to RB5BA
ER1M to SP9HWN
ER5AL to UO5OAL
ES6Z/0 to ES6DO
EU1YL to UC2BA
EW2CR to NF2K
EX8MF to IK2QPR
EX8W to DL8FCU
FM/F5PHW to F5PHW
FO5OU to F6GQK
FP/AD1E to AD1E
FR5HG/E to F6FNU
FS5PL/FG to FG5BG
H33C to HP2CWB
H44XF to G3TXF
HK0/DF5JT to DF3CB
HL9AK to N3BZA
HO3C to HP2CWB
II4ARI to IK4QIB
IR8A to I8ACB
J28ML to F5LBM
J3/K80QNS to KF0UI
JT1FAL to JR0CGJ
JT1M to JT1BG
JW0K to DL5EBE
JY74X to JY6ZZ
JY74Z to JY6ZZ
K4TVE/CY9 to WA4DAN
KW2P/CY9 to WA4DAN
LG5LG to SM0DJZ
LN1V to LA4LN
LX9UN to LX1NJ
LY95BA to LY3BA
LY95DS to LY1DS
N7QXQ/HR6 to NA7X
OA174QV to OA4QV
OL5JP to OK2BJR
P4/AA7VB to AA7VB
P40AN to CX3AN
P40CR to CX4CR
PQ0MM to PP5JR
R1FJC to RW6HS
R1FJV to RW3GW
R1FJZ to DF7RX
S07URE to EA4URE
S21YE to G0EHX
SV5/G4JVG to G3OZF
SV5/SM7DAY to SM7DAY
SV9/HA0ET to HA0HW
SV9/HA0ET/P to HA0HW
SV9/HA0HV to HA0HW
SV9/HA0HV/P to HA0HW
SV9/HA0HW to HA0HW
SV9/HA0HW/P to HA0HW
SV9/HG0D to HA0HW
SV9/HG0D/P to HA0HW
T20XC to JE1DXC
T8T to I1RBJ
T91CFG to 9A2AJ
T91EGR to 9A2AJ
T94NF to N2AUK
T94TG to 9A2AJ
T94YS to 9A2AJ
TF/WJ2O to WJ2O
TK0P to F6AUS
TM5RE to F5JPA
TY1IJ to DK8ZD
UG6JJ to GW3CDP
UN9LX to SM3DBU
UP50P to UN5PR
UR100IM to RB4IRO
UT100WL to UT1WL
UW100GA to AA4US
UX0ZZ to N3IRZ
UX100HX to UX3HX
V31DX to AA6BB
V63BM to JA6BSM
V63BP to JF6BCC
V63GY to JH6RTO
V63XB to JL1HCL
VE8RAC to VE3VGI
VE8TA to VE2BQB
VK6ISL to K1IYD
VK9XI to DJ9HX
VP2E/AI5P to AI5P
VP9DX to WB2YQH
VP9RND to WB2YQH
W5IJU/CY9 to WA4DAN
WA4DAN/CY9 to WA4DAN
WP4Q to KP4CKY
XJ2CQ to VA2RC
YT50BB to YU1NUF
YV1FPT/2 to YV2BYT
YW5LO to WS4E
Z31RB to DJ0LZ
ZA1AB to OH1MKT
ZA1AJ to OK2PSZ/OK2ZV
ZF2AH to WA6VNR
ZF2NE to W5ASP
ZK1AR to WB6HGH
ZK1DXP to DL7UVO
ZK3RW to ZL1AMO

long as planned, and they made only about a third of the promised number of contacts. It might well have gone into DX history as the worst major DXpedition ever, were it not for the disaster at Spratly only one month later.

The two operations took care of much of the demand for Heard, but by no means all, due to poor propagation. Heard Island dropped from second to 55th Most Wanted in the 1983 survey, and farther down to 62nd the next year. Other than a brief operation in 1988, Heard has not been heard on the amateur bands since the 1983 dual operations. It has steadily risen up the Most Wanted ranks, to its current fourth place position.

We all hope that the 1995 Heard Island DXpedition enjoys great success and has none of the problems that dogged the HIDXA team.

DXers wishing to read more about the HIDXA 1983 Heard Island DXpedition should ask Kirsti Jenkins-Smith, VK9NL, about copies of her book, *Heard Island Odyssey*. Write to her at P.O. Box 90, Norfolk Island 2899, Australia, for information.

Other November DX Events

The Oklahoma DX Association is sponsoring a DX Banquet on Saturday, November 11, at the River Oaks Golf Club near Oklahoma City. Doors open at 3 PM with videos of various DXpeditions and a talk on amateur radio in China. Banquet speaker is Craig Boyer, AH9B, on his Namibia and Easter Island operations. Cost is only $10, payable in advance only by November 1 to OKDXA, c/o Jim Hood, WV5S, 11623 Smoking Oaks Drive, Oklahoma City, OK 73150.

Members of the Whitton Amateur Radio Group will operate as **ZC4DX** from the British Sovereign Bases on Cyprus October 24 to November 6, including a multi-single entry in the CQ WW DX SSB Contest. QSL direct or via the bureau to David Bowman, G0MRF (ex-G8MRF).

GB5SI is a special operation from the Shetland Islands October 29 to November 7 by members of the Scottish MidLanark ARK. They'll also be active in the CQ WW DX SSB, where the Shetlands are a separate multiplier.

YS1ZKR will be active from El Salvador November 5–11, including the first amateur satellite operation. Operator and QSL route is Kent Roberg, N2MIP, 91 Forest Valley Road, Pleasant Valley, NY 12569.

Don Karonen, K8MFO, will be active as **VP2EFO** from Anguilla November 18–27, including a single-op entry in the CQ WW DX CW test. He'll be on CW only, concentrating on the new bands outside the contest. QSL via home call, direct or via the W8 bureau.

Canadian amateurs may use special prefixes for the last two months in 1995. The special prefixes, and their corresponding regular ones, are **XL2/VA2, XJ3/VA3, CJ7/VA7, VX1/VE1, CG2/VE2, XM3/VE3, VB4/VE4,**

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50Ω:300Ω	Off Center Fed Antennas	6:1-HB/U300	$89.95
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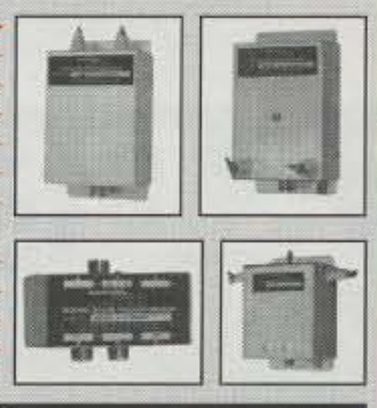

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9:1-HU50	50Ω:5.56Ω	$49.95
9:1-HU50	50Ω:5.56Ω	$49.95
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1.56:1-HDU50	50Ω:32Ω & 18Ω	$49.95
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310	OE6CLD/314	200	ZS4Y/215
300	EA5RJ/309	150	IK4UNR/189
300	N6RJY/308	150	EA3FBO/157
275	EA3CB/299	28 MHz	ZS4Y

CW Endorsements

320	N7RO/324	275	DJ1YH/288
320	K4IQJ/322	275	G4MVA/275
310	4N7ZZ/314	1.8 MHz	DJ1YH
310	G3KMQ/311		

Total number of active countries is 326. The basic award fee for subscribers to *CQ* is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an SASE is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business-size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for airmail reply. Please make all checks payable to the awards manager.

VF5/VE5, VG6/VE6, XM7/VE7, VC8/VE8, VA9/VE9, CZ9/VO1, CZØ/VO2, CK9/VY1, and **CKØ/VY2**. QSL via regular callsign.

QSL Notes

JWØKKI, is apparently a pirate information; alleged QSL manager W4FRU says he has no knowledge of the operation.

QSL **J75A** direct with SASE via George Steinert, N6ZS, 4600 Valley Hi Dr., Sacramento CA 95823, or via the W6 bureau.

QSL **XT2JB, TU4EI, TU5EV, 9L/TU5EV,** and **3C1/TU4EI** via Mac, W3HCW.

VS6BG says he is behind in his QSLing, but will be back in business soon. Please be patient.

QSL **TI9JJP** via José Pastora, P.O. Box 330, 1000 San José, Costa Rica.

QSL **TY1IJ** via DK8ZD.

QSL **V63BM** via JA6BSM and **V63GY** via JH6RTO.

QSL **ZP6CW** direct to Doug at Box 73, Caacupe, Paraguay. Do not send cards via Doug's stateside call of N4PW.

QSL Hamad Al-Nusif, **9K2HN**, via his new address: P.O. Box 29174, 13152 Safat, State of Kuwait.

QSL **S92SS** direct to P.O. Box 522, Sao Tomé, West Africa, and not via KY4P.

QSL **W4/YV5DTA** via his new address: 1920 NE First Terrace #104H, Fort Lauderdale, FL 33305.

This photo just goes to show that as Cass would say, "DX IS!"—wherever you find it. This company in New York knows how to advertise (Photo via Jerry, WM2V)

QSL the special **JY74X** and **JY74Z** operations via JY6ZZ.

QSL **3V8BB** as the operator requests. When YT1AD operates, QSL via his home call (ex-YU1TF); the Japanese operations are QSLed via JF2EZA.

OH1NYP has his own logs for his operation from **A61AF** September 24–26, 1994, but cannot confirm other A61AF contacts. QSL other QSOs direct.

FWØDX, asking for QSLs via F6FNU, was a pirate.

QSL Ahmed Saif, **A61AI**, via P.O. Box 20200, Dubai, United Arab Emirates. QSL Mohammed Khalifa, **A61AM**, via P.O. Box 22216, Dubai, UAE.

QSL **9M6** stations direct to Box 397, 88858 Tanjung Aru, Sabah, East Malaysia. The 9M2 bureau doesn't work for 9M6 stations. Direct only with SASE/IRCs or US$1.

Paul Fava, IK2QPR, is QSL manager for **YL1XZ, EU6MM, EW6WW, UN2O, EX8MF, EX2U, EX7MA, II2R, UL7OB, ULØOB, RLØO, UPØO, UC1WWO, UC2WO, UQ1GXZ, UM8MFO, UM7MA, UM8MU, UM8MCT, UM8MCY.** Address: Via Bertani 8, 46100 Mantova, Italy.

QSL **VE8TA** via operator Louis Paquet, VE2BQB, 776 Rte 132, Ste. Florence PQ, Canada G0J 2M0.

QSL Masa Mihara, **JE1DXC (T2ØDX, 5WØDX, ZK1DXC, etc.)**, to 4-22-23 Motobuto, Urawa 336, Japan. (Many sources have the street name incorrect.)

QSL **VQ9LW** via his home call: Larry Wolff, WA2ALY, 624 East Drive, Paramus, NJ 07652.

QSL the contest operations of **4G2X** (Philippines) via the *Callbook* address of DU3DO or via Pete Aguinaldo, 4F2IR, 89 T. Bugallon St., Aurora Hill, Baguio City, 2600 Philippines.

KH9KZE and **DJ8UY/ZA** are both pirate operations. Do not bother to QSL.

QSL the August 16–18 special-event operation of **YB5ØRI** via YBHZL.

QSL **LU5E**, active in the IARU contest, via operator Jorge Logiovine, LU5EWO, CC 19, Bragado 6640, BA, Argentina.

QSL **ZS9F, ZS95RWR,** and **ZS6YA** after April 1995 via KK3S, direct or via the W3 bureau. QSL ZS94F via ZS6YA, direct or via the ZS bureau.

73, Chod, VP2ML

WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

BY FREDERICK O. MAIA, W5YI

Amateur Radio and RF Safety

The FCC is considering a proposal to regulate RF exposures around amateur radio stations for the first time. The Commission has proposed to use new standards, because the RF guidelines they are currently using for other services have been updated.

Just how safe are amateur radio emissions in a residential environment? That is a question that the FCC is now pondering. In February 1985 the FCC approved new rules to implement the National Environmental Policy Act of 1969. Under NEPA, all agencies of the U.S. Government must take into account the potential environmental impact of their activity. It is the FCC's responsibility to decide whether its actions in the licensing or authorizing radio facilities significantly affect the quality of the human environment.

The only reference in the Part 97 Amateur Radio Service Rules to NEPA is contained in Sec. §97.13(a). It says nothing, however, about RF radiation exposure. Actually, there are no radio frequency safety rules mentioned in Part 97 at all. Sec. §97.13(a) mentions only that in instances where amateur station locations are located "on land of environmental importance or that is significant in American history, architecture or culture, the licensee may be required to take certain actions prescribed by Sec. §1.1301 to 1.319 of the FCC Rules." Very few amateurs know what that means.

Have you ever noticed line 6 on the Amateur Radio application FCC Form 610? It specifically asks you, "Would an FCC grant of your request be an action that may have a significant environmental effect?" If you answer "Yes" to this question, then an Environmental Assessment (EA) must be attached to the FCC Form 610.

Since practically no amateur radio operator has a copy of the FCC's Title 47 (Telecommunication) Part 1 Rules, everyone checks "No" to question 6 on the Form 610. Otherwise they would have to complete an Environmental Assessment: "Whatever that is?" An EA essentially is a written statement about why the planned radio operation will not adversely influence the environment.

While every amateur radio operator routinely answers "No" to this question, not many understand the question. When the public thinks about the adverse environmental effects of amateur radio transmissions, they usually believe it refers to the biological health hazards of radio frequency radiation. But that is not what the Part 97 Rules refer to! It talks only about "land." Why?

The reason is the RF radiation safety rules, which took effect on January 1, 1986, do not apply to amateur radio. They apply only to certain broadcast and commercial stations. Sec. §1.307(b) says an EA is to be prepared when "licenses to transmit or renewals, thereof" are granted: " . . . if workers or the general public [are exposed] to levels of radio frequency radiation in excess of the 'Radio Frequency Protection Guides' recommended in 'American National Standard Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300 kHz to 100 GHz,' (ANSI C95.1-1982) . . . "

The 1982 ANSI "advisory guidelines" are used by the FCC to evaluate environmental impact from RF transmitters. They recommend frequency-dependent exposure limits covering RF frequencies beginning at 300 kHz with more than seven watts input power.

It appears on the surface that these guidelines apply to all radio services. The fine print in Note 1 to this section, however, says that "Sec. §1.1307(b) shall apply only to certain facilities and operations licensed or authorized under the following parts of the Commission's Rules: 5, 21, 35, 73, 74 and 80." This means that (among other services) there are no government-mandated RF exposure limits for the Land Mobile (Part 90), Personal Radio (Part 95), or Amateur (Part 97) Services. They are categorically exempt.

The previous section in Part 1 does apply to amateur radio operators, and that is what amateur service Rule Sec. §97.13(a) refers to. That section (Sec. §1.307(a)) seeks to protect wilderness areas, wildlife preserves, threatened or endangered species and their habitats, historical and Indian religious sites, flood plains, and certain surface features such as wetlands and forests.

Sec. §1.307(a)(8) also requires an Environmental Assessment to be completed when an antenna tower is located in a residential area and is lighted with high-intensity white lights. This is to protect residents from the annoyance of the flashing "strobe" lighting. No Environmental Assessment must be completed for any other amateur antenna structure. Amateurs must, however, obtain prior approval from the FCC to install antenna structures higher than 200 feet (61 meters), since certain tower painting and lighting rules and FAA notification procedures must be complied with.

Exception To Categorical Exclusions

Amateur radio stations are exempt from having to comply with the ANSI-1982 radio frequency radiation guidelines. But does that mean an amateur radio operator can indiscriminately run 1.5 KW of RF with a high-gain antenna into a neighbor's bedroom? No, it does not!

Sec. §1.307(c), which went into effect on November 17, 1988, contains a little-known appeal process by which the FCC may still take corrective action—especially when a residential neighbor complains. The aggrieved person may submit a written petition to the appropriate FCC Bureau " . . . setting forth in detail the reasons justifying environmental consideration in the decision making process." For amateur radio this bureau is the Wireless Telecommunication Bureau. The WTB would then review the complaint, and if it finds that a significant environmental impact exists, it will require the applicant to prepare an EA. The WTB could even require an EA without a petition from the public.

Once the FCC Environmental Assessment is filed, the FCC decides if an "Environmental Impact Statement" is necessary. An EIS is required when the FCC concludes that the radio station would have (or has) a significant effect on the environment.

The result could be that the FCC will deny the amateur station license application or renewal. To the best of my knowledge, no one has ever appealed to the Commission under this process.

Responsibility For RF Safety

Theoretically, the FCC's expertise lies in telecommunications and not in the health and safety area. In reality this is not true, since the FCC staff includes Robert F. Cleveland, Jr., Ph.D. Dr. Cleveland is one of the nation's most respected and knowledgeable bio-physicists in the field of non-ionizing radio-frequency radiation. He also headed up a joint FCC/EPA survey of RF fields around amateur radio stations in 1990. Non-ionizing radiation is a form of electromagnetic energy. It includes ordinary light, which we can see, and infrared radiation, which we sense as heat. Another type of non-ionizing radiation we can't detect is RF radiation from natural sources such as the sun and man-made sources. These include various navigational, medical, and industrial equipment, and power lines and radio transmitters.

Electromagnetic waves travel in all directions and are the basis of amateur radio, since they can be varied (or "modulated") to carry information.

Ionizing radiation (such as x-rays) is known to have the potential to permanently damage the human body. Much less is known about the health hazards of non-ionizing radiation. We do know, however, that radio waves can heat living tissue (thermal effects). A microwave oven is an example. And there is growing evidence of other possible adverse (nonthermal) health effects of radio transmissions.

The FCC relies on other agencies and organizations for RF safety guidance. Federal agencies such as the Occupational Safety and Health Administration (OSHA); their research arm, the National Institute for Occupational Safety and Health (NIOSH); and the Food and Drug Administration (FDA) are involved. It is generally agreed, however, that the federal responsibility for developing national guidelines for public exposure to non-ionizing radiation rests with the U.S. Environmental Pro-

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tection Agency. Under the law (42 U.S.C. 2021(h)), one of EPA's duties is to provide "guidance for all federal agencies in the formulation of radiation standards."

Although the EPA has accepted this responsibility, many years have passed, and they have yet to issue RF radiation exposure guidelines. The reason they repeatedly have given is an inadequate lack of funding. An unsaid reason is the influence of many private-interest groups. There is currently no official, legally enforceable federal standard for protection of the public or workers from potentially hazardous exposure to RF radiation.

Lacking this guidance, in 1985 the FCC decided to use the non-government ANSI-1982 guidelines because they were scientifically based, widely accepted, and applicable to the general population and workers. The process of compliance with the FCC's environmental rules is generally through a process of self-certification.

Now the FCC is proposing to amend and update the ANSI-1982 RF exposure guidelines to the new more protective ANSI/IEEE guidelines adopted in 1992 (NPRM, Guidelines for Evaluating the Environmental effects of Radio Frequency Radiation, ET Docket No. 93-62). Basically, the American National Standards Institute (ANSI) and the Institute of Electrical and Electronics Engineers, Inc. (IEEE) are saying that their previous RF safety guidelines should no longer be used.

The new guidelines differ significantly from those they replace. For example, two "tiers" of exposure levels were recommended. One is for "controlled" environments (users or workers who are aware of the exposure), and another, generally more restrictive, is for "uncontrolled" environments involving the public, who is usually unaware of the exposure potential. Amateur stations get involved in both environments, since amateur operators are aware of the RF exposure, but their neighbors are not.

The new 1992 ANSI/IEEE guidelines have more restrictions on RF fields below 100 MHz, include previously excluded low-power handheld radios and cellular telephones, include devices with power levels of 7 watts and less, and remove the categorical exclusion of certain radio services previously thought of as having a negligible environmental impact—including amateur radio. Amateur stations could be required to complete an Environmental Assessment before going on the air and to certify that their transmissions do not exceed the new standard.

Included for the first time would be all handheld 2 meter (144–148 MHz), 1.25 cm (222–225 MHz), and 70 cm (420–450 MHz), and 23 cm (1240–1300 MHz) transceivers where the antenna is in close proximity to the body. The new standard extends the low-frequency range from 300 MHz to 3 kHz to limit the possibility of low-frequency RF shock and burn. It also includes the 60-cycle power-line frequencies that have been under biological hazard suspicion for some time. The high-frequency range is raised from 100 GHz to 300 GHz.

EPA Position On 1992 ANSI/IEEE

The amateur radio community will probably be surprised that the Environmental Protection Agency essentially disagrees with using the 1992 ANSI/IEEE standard as the federal RF

safety guideline. EPA is particularly opposed to the two-tier (controlled/aware and uncontrolled/unaware RF environment) concept. In the uncontrolled environment an additional safety factor is applied.

EPA argues that RF exposure in the 1992 ANSI/IEEE is incorrectly based on the environment and not on people. The agency says that its research—and that of other organizations—shows that certain groups of individuals (such as infants, the aged, ill and disabled, obese, pregnant women, and people dependent upon certain medication or in adverse environmental conditions such as heat and humidity) are more at risk than others. EPA recommends against the use of the two (controlled and uncontrolled) levels.

The agency further argues that the 1992 ANSI/IEEE standards do not describe the degree of awareness that a person must have to be included in the controlled-environment category. That awareness can vary from complete knowledge to almost no knowledge of RF exposure. And EPA says that " . . . awareness is not equivalent to protection."

The EPA Recommendations

The EPA believes the FCC should adopt more conservative RF safety guidelines and apply more restrictive exposure limits to any transmitters located in residential areas or locations where the RF source may be accessible to the public.

The EPA says there are "serious flaws" in the 1992 ANSI/IEEE standard "that call into question whether the proposed use of the 1992 ANSI/IEEE is sufficiently protective." The agency disagrees with the two-level approach, charging that it is "not directly applicable to any population group [and] . . . not well defined."

Rather than use the 1992 ANSI/IEEE RF safety standard, EPA believes the FCC might want to consider using the 1986 NCRP recommendations. They do not differentiate between workers (controlled) and the public (uncontrolled environment). The NCRP is the National Council on Radiation Protection and Measurements, a non-profit Congressionally chartered organization to develop RF exposure safety recommendations. NCRP deals primarily with ionizing radiation, but also released proposed criteria for non-ionizing radiation. Their guidelines are listed in NCRP Report No. 86, "Biological Effects and Exposure Criteria for Radio Frequency Electromagnetic Fields, April 2, 1986." EPA recommends 1986 NCRP because the RF radiation exposure limits are the same for both workers and the public and is more protective than 1992 ANSI/IEEE at higher frequencies. EPA suggests that the FCC might want to ask the NCRP to revise its 1986 report "to provide an updated, critical and comprehensive review of the biological effects on RF radiation and recommendations for exposure criteria." If, however, the FCC is determined to use the 1992 ANSI/IEEE guideline, then EPA also believes that all users of hand-held devices and amateur radio facilities should be considered the "public" and not "workers." This would make them subject to more protective RF standards.

Will The EPA Issue Its Own Guidelines?

There is reason to believe that it will, but there is no telling exactly when this will be. Congress has drastically cut EPA's budget, and EPA, like all other federal agencies, is in the midst of a reorganization. There is universal agreement that there is a need for federal guidelines to be established by a credible, federal agency with expertise and jurisdiction in the field.

Because of the lack of RF standards, local and state bodies are adopting standards on their own, often without the necessary scientific expertise. The lack of a federal standard or guideline has led to a patchwork of state and local regulations. This has contributed to public apprehension, controversy over potential risks to public health from existing and developing technology, and expensive litigation.

The FCC depends on health and safety organizations such as EPA for the standards that the FCC would then enforce. FCC has suggested that EPA endorse the 1992 ANSI/IEEE guidelines, but they have not. This is probably why the FCC still has not taken final action on their proposal to use the 1992 ANSI/IEEE guidelines. If the Commission uses these guidelines anyway, EPA wants them modified to include more protective exposure limits at lower and higher frequencies.

Earlier this year the EPA released a two-volume report on a Radiofrequency Radiation Conference it convened in 1993. The conference was attended by 200 of the nation's top scientists, industrialists, doctors, and policy makers in the field of human health effects of exposure to RF radiation. The outcome of the conference contained two key conclusions: (1) that there was sufficient information on thermal exposure/effect on which to base a standard, and (2) that the EPA should develop some type of RF radiation exposure guidelines, even if EPA does so only on an interim basis.

Much of the two-volume report contains the conclusions of various panels and is extremely technical and difficult to understand. But (for what it is worth) here are some of the conclusions by the various panels:

1. There could be a significant cost to the AM/FM broadcast radio industry to comply with the 1992 ANSI/IEEE standards.

2. EPA should develop a standard based on four effects: (a) no physiological harm, (b) measurable effects but no known consequences, (c) minimal consequences, and (d) adverse effects on bodily functions/organisms.

3. Various mortality studies of radio operators, telecommunications workers, and radio and TV repairmen showed marked increases in blood cancer (leukemia) and brain cancer. A similar MIT study, however, showed no increase in leukemia or brain cancer, but an increase in Hodgkins disease. Human data is currently limited and incomplete, but there is reason to believe that RF radiation may be a carcinogen.

4. Animals (mammals) exposed to sublethal RF intensities showed exposure can cause birth defects, cancer, cataracts, and affect the thermo-regulatory system, immune system, central nervous system, blood-brain barrier, and behavior. Further research is needed to confirm or refute that these laboratory findings apply to human beings.

5. Any RF standard should be in some form of federally mandated or approved maximum exposure limits from a health and safety agency such as EPA. It may need to be on an interim, phased in basis.

6. The conference expressed full confidence in the ability of the EPA to develop RF safety standards.

Developing The Standards

Last year EPA convened an inter-agency group composed of representatives from various federal agencies. It included the EPA, FCC, Food and Drug Administration (FDA), National Institute for Occupational Safety and Health (NIOSH), National Telecommunications and Information Administration (NTIA), and the Occupational Safety and Health Administration (OSHA). The purpose of the work group was to address the development of RF radiation exposure guidelines which EPA hoped to be able to release this year.

It now appears that these guidelines will be indefinitely delayed until the EPA resolves the funding and reorganization issue. An EPA official told us, "We will have to wait until things settle down before we can get back on track again." The agency still hopes to issue the RF safety guidelines, since they have put a great deal of work into it. "It won't be a standard, since we are not going through the required regulatory development. We simply will write a report that will address the various issues. Recommended exposure limits will be contained in the report. They would represent our recommendations."

We were told that the new guidelines would be an entirely new look at how to establish RF exposure limits. "It would be based on what is understood at this time. And that is, RF radiation absorbed by the body can cause temperature elevation. We do not know really much about nonthermal effects and the report probably will not address nonthermal issues." The EPA said their guidelines would be consistent with their previous position on RF exposure.

73, Fred, W5YI

Announcing:

The 1996 CQ World-Wide 160 Meter DX Contest

CW: 2200Z January 26 to 1600Z January 28
SSB: 2200Z February 23 to 1600Z February 25

The objective of these contests is for amateurs around the world to contact other amateurs in as many U.S. states, Canadian provinces, and countries as possible on the 160 meter band.

Classes: Single and multi-operator only. Use of packet, a spotting net, or logging assistance makes an entry multi-operator. Multi-operators should show the actual operator for each QSO. Under single operator there will be a designation of power level: H = power over 150 watts, L = power under 150 watts, and Q = 5 watts or less. There will continue to be only listings per state or country, but if there is sufficient activity or if a high enough score is made, then a separate certificate will be issued. Minimum score for the separate certificate is 5,000 points! Multi-operators will all be considered high power.

Exchange: RS(T) and state for USA, province for Canada, and either prefix or country abbreviation for DX. Contacts without some location indicator will be ruled invalid.

Scoring: Contacts with stations in own country, 2 points. Contacts with other countries on same continent, 5 points. Contacts with other continents, 10 points. *Maritime mobile contacts count 5 points. There is no longer any multiplier value for a maritime mobile contact.*

Multiplier: Each continental U.S. State (48), Canadian area (13), and DX Country. KL7 and KH6 are considered DX and not states for this contest. DX countries are DXCC plus WAE (IT, GM Shetland Islands, et al). Canadian areas include VO1, VO2, NB, NS, PEI, VE2, VE3, VE4, VE5, VE6, VE7, NWT, and Yukon.Do not count States and Canada as separate countries. Remember that maritime mobiles no longer count as a multiplier.

Final Score: Total QSO points times the sum of all multipliers (states, VE, DX countries).

Penalties: Three additional contacts may be deleted for each unacknowledged duplicate or unverified contact removed from the log.

Disqualification: A log may be disqualified for violation of amateur radio regulations, unsportsmanlike conduct, or claiming excessive duplicate/unverified contacts or false multipliers. If the corrected score without penalties shrinks more than 5%, disqualification may be issued. A warning may be issued if an entry borders on disqualification, and the calls of those warned or disqualified will be printed with the results!

Awards: Certificates will be awarded to the top scorers in each class by state, Canadian area, and DX country. Runners-up with high scores over 100,000 may also receive certificates. Low power or QRP entries may also receive certificates if there is sufficient activity or the score is outstanding. The following plaques, with donating sponsors as indicated, will be awarded for exceptional efforts.

1996 PLAQUES

SINGLE OPERATOR

	CW	SSB
World	K5AAD	K5AAD
(N5JJ Memorial Plaques)		
USA	K4TEA	K4JRB
Canada	W8BLA	N4UCK
Zone 3 USA	KM4MG	N4TMW
Zone 4 USA	KI4XO	KC4MJ
Zone 5 USA	WA4CUG	K4ODL
Europe	(pending)	N4NX
Africa	K4MZW	WB4ZNH
Oceania	KM4FV	K4DLI & KB4SSS
Asia	NE4S	W8BLA[1]
Japan[2]	WØZV	—
S. America	K4JAG[3]	AE6E
N. America[4]	CQ	CQ
(N4IN Memorial Plaques)		

MULTI-OPERATOR

World	N4RJ	SE DX Club
USA	WS9V	WB9Z

[1] AA6V Memorial Plaque.
[2]No SSB operation is allowed in Japan at present.
[3]Roy V. Brewer, W4UHH Memorial Plaque.
[4]North America outside USA and Canada.

The procedure for the plaques is that the top scorer in the indicated area wins the plaque. However, a station can only win one plaque per contest section. The plaque is then awarded to the next highest scoring station. For example, WX8ZZZ wins top World multi-operator. Then the next station in the U.S.A. wins the U.S.A. plaque.

Intercontinental DX Window: 1830 to 1835 kHz should be left clear for DX stations for intercontinental QSOs in both contests. This is still voluntary but essential if the contest is to continue to attract rare DX as entries. **USA, Canadian, and European stations should refrain from using the window for local contacts.** Let's all make this work and increase our scores! This is a gentleman's contest and band, so let's help make intercontinental contacts happen.

Computer Logging: Please send us your computer disk. IBM, MS-DOS compatible disks are encouraged. The format we prefer is your CT.Bin or NA.Bin file. If you use a program different from the one mentioned above, the generic format should contain a vertical single column of calls in chronological order. The committee will require, on request, a disk for any possible high score, provided that the paper log or dupe checking material as originally submitted was a computer printout. The outside of the disk should be clearly labeled with the call of the entrant, the files included, the mode (SSB or CW), and the category. Disks **must** be accompanied by a paper log or are subject to **penalties or disqualification**.

Manual Logs: Sample log and summary sheets may be obtained from *CQ* by sending a large SASE with sufficient postage to cover your request. You can make your own with 40 contacts per page with columns for GMT, exchanges, multiplier, and points.

Dupe/Check Sheets: All logs over 200 contacts must provide a check sheet or dupe list. A check sheet or dupe list is a list of all calls in alpha sorted order.

For All Logs: Show the multiplier only the first time it is worked. Each page must have sub-totals for multipliers, contacts, and points. A running total below the sub-total on each page is recommended. Dupe or check sheets with every entry are requested and are required with over 200 QSOs. Include a summary sheet with your entry showing the scoring and other essential information. Include a printed name/mailing address and a signed declaration that all rules have been observed. Please put the summary sheet at the front of the log. All logs should clearly indicate total multiplier, W/VE multiplier, and DX multiplier.

Club Competition: Any club that submits at least three logs can enter the Club Competition. The name of the club must be clearly identified under club competition on the summary sheet. Club competition is a "for fun" competition to foster more activity. There is a separate listing for the club scores.

Log Submissions: Mailing deadline for CW entries is February 28, 1996, and March 31, 1996 for the SSB section. *Exception:* You may send both logs in one package as long as the CW log is received by March 31, 1996. Try to mail early to assure receipt. For a return receipt enclose an SASE or SAE with postage or 1 IRC. Avoid the registered postal route, as this delays getting the log until someone can sign the receipt! Finally, proof read your log before submission. Each year many errors are corrected that you should catch! Logs or sections of a log that are unreadable will be disqualified.

Send all logs to 160 Meter Contest Director David L. Thompson, K4JRB, 4166 Mill Stone Court, Norcross, GA 30092 USA. **Please indicate CW or SSB on the envelope.** ■

1995 CQ WPX SSB Contest
High-Claimed Scores

SINGLE OPERATOR
ALL BAND
UNITED STATES

KM1H 7,016,016
W3BGN 4,311,972
N7AVK 4,083,795
K3ZO 3,778,490
WZ4F 2,826,318
KI4HN 2,772,952
KA4RRU 2,499,200
NB7N 2,447,864
K5ZD 2,415,520
WA7FOE 2,247,900
NQ4I 2,222,208
K4VUD 2,081,968
KC7V 1,816,734
K6HNZ 1,761,300
W6TKF 1,755,444
NXØI 1,671,320
AJ7/JK2VOC 1,438,400
WM4Z/5 1,397,088
N3MKZ 1,317,680
KM6YX 1,218,025
WA4LZR 1,136,026
KC6X 1,128,305
N1HRA 1,101,480
KF2O 1,090,880
NW6S 1,058,743

28 MHz

KY5N 18,204
K2EEK 5,494

21 MHz

KC2X 1,471,080
KZ5D 1,183,955
N2MM 787,520
WC4E 772,708
W6BSY 286,296

14 MHz

KC1XX 4,877,880
WE9V 3,744,000
KK9A 2,896,950
K1KJT 826,200
KI5JC 674,424

7 MHz

KC7EM 1,950,228
N7DD 1,684,620
W3GH 712,008
KF8UM 198,584
K8DO 72,046

3.7 MHz

WE3C 1,534,032
KE1Y 1,325,116
KS9K 1,222,640
AB6ZV 796,262
KY2J 625,164

1.8 MHz

K1ZM 332,148
AC4NJ 149,940
AA4MM 88,400
KA7T 6,192
KG5YA 5,840

DX
ALL BAND

EA9AM 16,061,661
P4ØR 15,876,027
ED8OR 15,048,890
HC1OT 11,168,450
6D2X 10,568,448
LT6E 8,528,400
PQØMM 8,476,200
4X2T 7,982,246
3G1X 7,146,732
RZ9UA 7,142,014
OM8A 6,359,171
IR8A 6,289,491
GW4BLE 6,159,513
ZP6XR 5,582,864
TM7XX 5,444,698
4NØAV 5,218,445
OH8LQ 4,005,855
VK5GN 3,939,821
PJ9T 3,894,660
UT7QF 3,771,176
OH1AD 3,746,961
OH1EH 3,424,011
YT1AD 3,264,954
UTØD 3,094,989
VA3MG 3,061,422
TM3U 2,866,824

28 MHz

ZVØW 1,553,050
ZY5C 1,261,744
ZL1AXB 186,189
WH6CQH 41,587
GØAEV 25,947
SP9LAB 8,832

21 MHz

ZW5B 14,095,142
ZPØY 12,523,317
PY4OY 6,532,974
N6BFM/9K2 5,320,458
5H3CK 3,066,482
OK1RI 3,048,168
9Q5TT 2,211,552
JI2UNR 1,687,320
CE6DFY 960,540
IR4B 956,130

14 MHz

PYØFM 9,691,296
KP2A 7,112,688
CJ7NTT 4,964,146
IU9S 4,641,000
N6VI/KH6 4,019,342
9A7A 3,936,848
VA3MM 3,053,795
OH1JD 3,017,643
Z3ØM 2,790,564
SP5GRM 2,789,352

7 MHz

TE1C 7,281,630
ED9LZ 6,110,688
S5ØA 4,647,500
OT5T 4,437,396
S5ØC 3,724,704
VK3EW 3,222,576
F2EE 2,882,922
II3T 2,689,380
CJ2DR 2,354,282
4M5R 2,153,736

3.7 MHz

CJ7SZ 1,799,352
S57AW 1,764,654
TO2DX 1,568,320
S57O 1,251,200
ON9CJM 1,223,880
LY6M 1,196,506
G3NLY 1,188,000
OL2M 754,754
IN3ZNR 739,970
IV3YYK 723,000

1.8 MHz

S58AB 426,216
9A4D 305,728
LY3BS 222,300
S5ØM 146,970
RU4AA 89,950

LOW POWER
ALL BAND
UNITED STATES

WS1A 967,600
N7LOX 730,132
NZ5O 722,768
WW3S 647,972
AI2C 645,216
ACØW 604,384
K2QMF 567,760
WA4ZXA 528,990
AA1EY 524,032
NT5D 436,536

28 MHz

KD4HXT/T 24,596
KC3PZ 23,622
WB2BZR/3/T 17,802
K6SVL 12,322
KA1VMG 3,626

21 MHz

WA7BNM 448,448
WJ7S 399,630
N5NMX 100,394
KU6T 20,352
WJ3N 8,512

14 MHz

WF1L 557,112
KA4KFQ 443,785
WA6KUI 408,480
AKØA 353,424
N4YGY 329,406
W7HS 65,746
WT8P 47,854
WV1C 20,748
KC7JDL 9,372
N2YLG 4,758
WB2BAU 3,572

7 MHz

K9FOH 26,492

3.7 MHz

W4YDD 9,120
AB5HD 1,558

1.8 MHz

WO9S 5,220

DX
ALL BAND

EL2PP 10,105,888
FS5PL 7,528,698
VP2EN 5,809,758
L37N 3,257,067
5T5JC 2,877,105
S5ØR 2,716,285
HK3JJH 2,238,150
VP5A 2,178,100
CJ6JO 2,037,497
YL2TW 1,872,640

28 MHz

L3HL 913,894
LU1MA 843,980
LU3HIP 811,590
LU2DW 781,280
LU4OJS 594,145

21 MHz

CX6VM 1,663,365
PP5UA 1,527,760
GIØKOW 901,478
YC3BC 652,460
EA3CWS 417,942

14 MHz

IB4M 5,204,571
XM7A 3,214,840
GIØUJG 2,315,250
IR9B 2,129,920
ZF1DX 1,445,455
CJ2SPY 948,930
CT8BWW 905,625
VE6BMX 548,034
LU6AMD 467,172
ON4ALW 405,750

7 MHz

S54ZZ 830,700
IR4R 712,920
LY2BUU 173,886
SV2AEL 107,508
JR7OMD/2 102,240

3.7 MHz

F5BEG 277,680
DL5FDA 264,810
EA3CWT 242,008
HA4FV 206,736
PAØMIR 155,940

ASSISTED
USA
ALL BAND

KA2AEV 4,700,540
KY2T 3,155,196
W6XR/2 1,681,120
WA4CHI 1,440,330
NE9U 1,109,220
KC3MR 1,108,480
NO9Z 878,570
KW4T 807,818
N1CC/2 801,837
KA7ZUM 707,520

DX
ALL BAND

ZS9F 4,128,331
IN3ASW 1,475,370
ED5OL 1,140,736
JF1SEK 1,073,237
EA3AOK 957,096
IO2A 801,121
VX3VET 675,612

28 MHz

LU7HLF 904,383

21 MHz

7L1FPU/1 141,040

14 MHz

CJ7SBO 2,053,358
IR6A 1,005,178

MULTI-OPERATOR
SINGLE TRANSMITTER
UNITED STATES

N3BB 5,050,483
KT8X 4,184,712
NE8T 4,119,200
WX1Z 3,416,129
N4ZZ 2,669,586
WV6U 2,664,116
KU8E 2,330,498
NCØP 1,986,023
KF9PL 1,935,780
KRØB 1,735,000
KØIJL 1,624,784
NX3Y 1,580,904
WB8ENR 1,535,490
WY3T 1,512,864
WK1P 1,335,129
W6EEN 1,254,825
NW2B 1,179,023
KC1F 1,170,700
WO9Z 1,115,400
AEØM 855,782

DX

P4ØV 21,452,419
TM1C 13,710,246
EA8BR 13,447,400
CT9M 12,493,227
IR4T 11,496,040
LZ9A 11,311,089
CT5P 10,180,656
P39P 9,824,744
CT8T 9,428,172
XX9X 9,078,220
LV1V 8,755,968
C49C 8,552,816
FO5IW 8,374,432
TO5GI 8,298,000
4M3B 8,192,850
VP2MDE 7,852,355
F9IE 7,470,876
CK7U 7,317,729
OE2S 6,744,965
VX2LR 6,717,150

MULTI-OPERATOR
MULTI-TRANSMITTER
UNITED STATES

WA1LNP 880,453
WA8LOW 512,068

DX

KP4XS 27,277,890
LU4FM 24,757,760
HG73DX 21,711,532
OT5A 19,836,180
VE7ZZZ 8,005,021
6E2T 7,121,946
LY7A 5,245,882
VX6FI 4,732,931
OF1AA 2,801,259
4N5ØA 2,758,088

QRP/p
UNITED STATES

KA1CZF ..... A 175,956
N1AFC ..... A 175,925
N8AXA 14 1,219
W1MK 3.7 5,304

DX

JA6GCE ..... A 599,860
YU1LM ..... A 137,751
JR2BNF/1 ..... A 113,580
LA5FBA 21 40,171
VE6SH 21 8,037
RW9AB 14 699,648
LY3NJM 1.8 126

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TM-255A

PROPAGATION

BY GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

CW DX Contest Special

The CW weekend of the 1995 CQ World-Wide DX Contest will take place on November 25–26. Special DX Propagation Charts for use during both the Phone and CW weekends appeared in last month's column, along with valuable tips and suggestions for increasing scores. Be sure to refer to last month's column if you plan to participate in the CW Contest weekend. Additional tips are discussed in this month's column.

Sunspot Cycle Progress

The Royal Observatory of Belgium reports a monthly mean sunspot number of 15 for July 1995. This results in a 12-month running smoothed sunspot number, upon which the cycle is based, of 24 centered on January 1995. The highest value observed during the month was a count of 30 on July 1. The sun was completely devoid of any spots on July 24, 25, 28, 29, and 30.

A five-month plateau in the present cycle during which time solar activity remained relatively constant at a level between 26 and 27 seems to have ended during July. The cycle appears to have resumed its slow decline towards a minimum, which is expected during 1996.

If the cycle continues its present rate of decline, a smoothed sunspot number in the mid-teens can be expected for November 1995.

A corresponding 10.7 cm mean solar flux level of 76 was reported for July by the Dominion Radio Astrophysical Observatory at Penticton, B.C. This results in a smoothed solar flux value of 80 centered on January 1995. A smoothed level of approximately 73 is expected during this November.

Solar activity during November 1995 is expected to be on the order of 10 points less than the 26 level observed last November. A level in the mid-teens is considered to be very low solar activity. The last *CQ* World-Wide CW DX Contest held under similar sunspot conditions took place in 1985.

It is unlikely that any DX records will be broken during the 1995 CW Contest period, but even during the low period of a solar cycle interesting and exciting DX possibilities exist.

Updated Propagation Data

Updated propagation data is always useful to HF communicators, but it becomes invaluable during DX Contests. Fig. 1 is a sample of a daily propagation bulletin issued by the Space Environmental Services Center (SESC), NOAA in Boulder, Colorado. It is updated every six hours. It contains a worldwide summary of observed conditions, and a prediction of conditions expected during the next six hour period. It also contains the latest values of 10.7 cm solar flux and the worldwide Ap geomagnetic index.

As mentioned in last month's column, this bulletin as well as a wealth of other propagation, solar, and geomagnetic data can be obtained directly from the SESC Bulletin Board through modem-equipped computers by dialing (303) 497-5042. It can also be obtained over the INTERNET, at the following ftp address: ftp.sel.noaa.gov

The bulletin can be found in the public file (pub), the FORECAST directory, and the HFRP sub-directory.

There is no charge for the use of the Bulletin Board or the ftp. Arrangements can be made to receive the bulletins every six hours on a continuous basis via Internet by requesting this with the following e-mail:

To: majordomo@sel.noaa.gov
subscribe hfprop-list
(your e-mail address)
end

Last month's column contained special DX Propagation Charts for use during both Phone and CW sections. The following is a summary of conditions and other propagation tips that should be useful during the contest weekend specifically and during the month of November generally.

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for November 1995

Propagation Index.....	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 10, 17, 20-21	A	A	B	C
High Normal: 2, 5-7, 11, 15-16, 22-23, 29	A	B	C	C-D
Low Normal: 1, 3-4, 8-9, 12-13, 18-19, 24, 27-28	B	C	D	D-E
Below Normal: 14, 25-26, 30	C	C-D	D-E	E
Disturbed: None	C	D	E	E

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S9 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.

2. With the *propagation index,* use the above table to find the expected signal quality associated with the band opening for any date of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be fair (C) on November 1st; good (B) on the 2nd; fair (C) on the 3rd and 4th; good (B) from the 5th through the 7th, etc. Fair-to-poor (C-D) conditions are forecast for November 25 and 26 during the 1995 World-Wide DX CW Contest weekend.

World-Wide DX Contest Bulletin

Since this issue of *CQ* should reach most subscribers prior to the start of the CQ World-Wide DX SSB Contest weekend of October 28–29, here is an updated forecast made at press time for the general propagation conditions expected during the SSB Contest weekend.

Based on the 27- and 54-day recurrence tendency for HF propagation conditions, there is a high probability for at least Low Normal conditions on October 28, the first day of the SSB Contest weekend. Conditions may increase to High Normal at times in lower and equatorial latitudes. However, there is an possibility that a radio storm may begin during the 29th, dropping conditions to Below Normal for paths crossing the auroral and polar regions. Low Normal conditions are likely in lower and equatorial latitudes.

Check on-the-air conditions on October 1 and 2, which would be just one 27-day cycle prior to the SSB Contest weekend, for a more probable recurrence pattern. During the contest be sure to check with the forecast sources discussed in last month's as well as this month's column for up-to-the-minute reports on ionospheric conditions. The initial forecast for the CW Contest weekend of November 25–26 looks like a radio storm may occur, but hopefully of no more than minor intensity. Conditions should be mostly Low Normal in middle, low, and equatorial latitudes, with some periods Below Normal. Below Normal conditions are likely for paths crossing the auroral and polar regions.

A fined-tuned press-time update for the CW Contest weekend will appear as a bulletin in next month's column.

Contest Tips

Midnight to Sunrise: Check 20 meters for openings to the South Pacific until midnight, or perhaps as late as 1 AM in the EST and CST time zones, and until 3 AM in MST and PST zones. Band may also remain open for an hour or so after midnight to deep South America and Antarctica. Best band during this time period should be 40 meters. Look for openings towards Europe, the Middle East, and parts of Africa until 3 AM in EST and 2 AM in CST zones. Check for long-path openings between 6 and 8 AM in PST zones. Good openings from all time zones towards South America should be possible, with signals strongest to the Caribbean area, Central America, and the northern countries of South America between midnight

11307 Clara Street, Silver Spring, MD 20902

CQ Short-Skip Propagation Chart
November & December 1995
Local Standard Time
At Path Mid-Point
(24-Hour Time)

Band (Meters)	Distance Between Stations (miles) 50-250	250-750	750-1300	1300-2300
10	Nil	Nil	11-16 (0-1)	11-16 (1-0)
15	Nil	10-16 (0-1)	09-10 (0-1) 10-12 (1) 12-16 (1-2) 16-17 (0-1)	09-10 (1) 10-12 (1-3) 12-14 (2-4) 14-15 (2-3) 15-16 (2) 16-17 (1) 17-18 (0-1)
20	Nil	09-11 (0-1) 11-16 (0-2) 16-19 (0-1)	08-09 (0-1) 09-11 (1-4) 11-16 (2-4) 16-17 (1-3) 17-18 (1-2) 18-19 (1) 19-21 (0-1)	07-08 (0-1) 08-09 (1-3) 09-11 (4) 11-15 (4-3) 15-16 (4) 16-17 (3) 17-18 (2-3) 18-19 (1-2) 19-20 (1)
40	07-09 (0-1) 09-10 (1-3) 10-15 (3-4) 15-16 (2-3) 16-18 (1-2) 18-20 (0-1)	07-09 (1-3) 09-10 (3) 10-15 (4-3) 15-16 (3-4) 16-18 (2-4) 18-20 (1-2) 20-00 (0-2) 00-07 (0-1)	07-09 (3) 09-14 (3-1) 14-15 (3-2) 15-16 (3) 16-18 (4) 18-20 (2-4) 20-22 (2-3) 22-00 (2) 00-04 (1-2) 04-07 (1-3)	07-08 (3-2) 08-09 (3-1) 09-14 (1-0) 14-15 (2-0) 15-16 (3-1) 16-17 (4-2) 17-18 (4-3) 18-20 (4) 20-22 (3-4) 22-00 (2-3) 00-02 (2) 02-04 (2-3) 04-06 (3)
80	08-16 (4) 16-18 (2-4) 18-20 (1-3) 20-06 (1-2) 06-08 (2-3)	08-09 (4-2) 09-16 (4-1) 16-18 (4-2) 18-20 (3-4) 20-06 (2-4) 06-07 (3-4) 07-08 (3)	08-09 (2-1) 09-16 (1-0) 16-18 (2-1) 18-20 (4-3) 20-06 (4) 06-07 (4-2) 07-08 (3-1)	08-09 (1-0) 09-16 (0) 16-18 (1-0) 18-20 (3-2) 20-04 (4-3) 04-06 (4-2) 06-07 (2-1) 07-08 (1)
160	07-09 (3-2) 09-11 (2-0) 11-17 (1-0) 17-19 (3-2) 19-07 (4)	07-09 (2-1) 09-17 (0) 17-19 (2-1) 19-04 (4) 04-06 (4-3) 06-07 (4-2)	06-07 (2-1) 07-09 (1-0) 17-19 (1-0) 19-20 (4-2) 20-21 (4-3) 21-04 (4) 04-06 (3-2)	06-07 (1-0) 07-19 (0) 19-20 (2-1) 20-21 (3-2) 21-04 (4-2) 04-06 (2-1)

HAWAII
Openings Given In
Hawaiian Standard Time#

	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	09-12 (1)	07-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-14 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-13 (2) 13-15 (3) 15-16 (2) 16-17 (1)	16-18 (1) 18-21 (2) 21-02 (3) 02-03 (2) 03-04 (1) 18-20 (1)* 20-02 (2)* 02-03 (1)*
Central USA	09-10 (1) 10-12 (2) 12-13 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (4) 13-14 (3) 14-15 (2) 15-16 (1)	06-07 (1) 07-08 (3) 08-12 (2) 12-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	16-18 (1) 18-20 (2) 20-02 (3) 02-04 (2) 04-05 (1) 18-20 (1)* 20-02 (2)* 02-04 (1)*
Western USA	09-11 (1) 11-13 (2) 13-15 (1)	07-09 (1) 09-10 (2) 10-13 (4) 13-14 (3) 14-15 (2) 15-17 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-15 (4) 15-16 (3) 16-18 (2) 18-20 (1)	15-17 (1) 17-18 (2) 18-20 (3) 20-02 (4) 02-05 (3) 05-06 (2) 06-07 (1) 17-18 (1)* 18-20 (2)* 20-04 (4)* 04-05 (2)* 05-06 (1)*

ALASKA
Openings Given In GMT

	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	20-22 (1)	18-20 (1) 20-22 (2) 22-23 (1)	12-14 (1) 17-20 (1) 20-23 (2) 23-01 (1)	00-11 (1) 11-13 (2) 13-14 (1) 07-12 (1)*
Central USA	20-23 (1)	18-20 (1) 20-23 (2) 23-00 (1)	13-15 (1) 18-20 (1) 20-21 (2) 21-23 (3) 23-01 (2) 01-02 (1)	01-12 (1) 12-14 (2) 14-15 (1) 07-13 (1)*
Western USA	21-23 (1)	19-20 (1) 20-21 (2) 21-23 (3) 23-00 (2) 00-01 (1)	17-19 (1) 19-20 (2) 20-21 (3) 21-23 (4) 23-00 (3) 00-02 (2) 02-03 (1)	00-01 (1) 01-02 (2) 02-03 (3) 03-14 (2) 14-16 (3) 16-17 (1) 04-09 (1)* 09-12 (2)* 12-14 (1)*

*Indicates best times to listen for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.

For 12 meter openings interpolate between 10 and 15 meter openings.

For 17 meter openings interpolate between 15 and 20 meter openings.

For 30 meter openings interpolate between 40 and 20 meter openings.

Note: The Alaska and Hawaii Propagation Charts are intended for distances greater than 1300 miles. For shorter distances use the preceding Short-Skip Propagation Chart.

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (15 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An * indicates the best time to listen for 80 meter openings.

2. The propagation index is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of days during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

3. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 AM; 13 is 1 PM, etc. In the Short-Skip Chart appropriate *standard* time is used at the path midpoint. For example on a circuit between Maine and Florida, the time shown would be EST, on a circuit between New York and Texas, the time at the midpoint would be CST, etc. Times shown in the Hawaii Chart are in HST. To convert to standard time in other USA time zones add 2 hours in the PST zone; 3 hours in the MST zone; 4 hours in the CST zone; and 5 hours in the EST zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 14 or 2 PM in Los Angeles; 17 or 5 PM in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *standard* time in other areas of the USA subtract 8 hours in the PST zone; 7 hours in the MST zone; 6 hours in the CST zone; and 5 hours in the EST zone. For example, at 20 GMT it is 15 or 3 PM in New York City.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts CW or 300 watts PEP on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts CW or 1 KW PEP on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the propagation index will increase by one level; for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

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CIRCLE 157 ON READER SERVICE CARD

PRIMARY HF RADIO PROPAGATION REPORT ISSUED AT 02/0522Z SEP 95.
PART I. SUMMARY 02/0000Z TO 02/0600Z SEP 95/
FORECAST 02/0600Z TO 02/1200Z SEP 95.

		QUADRANT I 0 TO 90W	II 90W TO 180	III 180 TO 90E	IV 90E TO 0
REGION	POLAR	N5	N5	N5	N5
	AURORAL	N4	N4	N5	N5
	MIDDLE	N6	N6	N6	N6
	LOW	N7	N7	N7	N7
	EQUATORIAL	N6	N7	N7	N7

PART II. GENERAL DESCRIPTION OF HF RADIO PROPAGATION CONDITIONS OBSERVED DURING THE 24 HOUR PERIOD ENDING 01/2400Z, AND FORECAST CONDITIONS FOR THE NEXT 24 HOURS. OBSERVED CONDITIONS WERE NORMAL.
FORECAST: EXPECT NORMAL CONDITIONS THROUGH THE FORECAST PERIOD.
PART III: SUMMARY OF SOLAR FLARE INDUCED IONOSPHERIC DISTURBANCES WHICH MAY HAVE CAUSED SHORT WAVE FADES IN THE SUNLIT HEMISPHERE DURING THE 24 HOUR PERIOD ENDING 01/2400Z SEP 95 . . . NONE.
PROBABILITY FOR THE NEXT 24 HOURS . . . NIL.
PART IV. OBSERVED/FORECAST 10.7 CM FLUX AND K/AP.
THE OBSERVED 10.7 CM FLUX FOR 01 SEP 95 WAS 074.
THE FORECAST 10.7 CM FLUX FOR 02, 03, AND 04 SEP 95 ARE 074, 074, AND 073.
THE OBSERVED K/AP VALUE FOR 01 SEP 95 WAS 01/05.
THE FORECAST K/AP VALUES FOR 02, 03, AND 04 SEP 95 ARE 02/07, 02/07, AND 03/15.
SATELLITE X-RAY BACKGROUND: A2.4 (2.4 E MINUS 05 ERGS/CM SQ/SEC).
THE EFFECTIVE SUNSPOT NUMBER FOR 01 SEP 95 WAS 028.0.
99999

*Fig. 1– Sample of Propagation Bulletin issued every six hours by SESC/NOAA, Boulder, Colorado. It is available by Bulletin Board and via Internet. The letter indicates present propagation conditions in various areas of the world (**N** normal conditions; **U** unstable conditions subject to fading and noise; **W** ionospheric storm in progress. The numerical ratings are forecasts for the next six hour period with **9** excellent; **8** very good; **7** good; **6** fair-to-good; **5** fair; **4** fair-to-poor; **3** poor; **2** very poor; **1** impossible.*

and 5 AM in EST and CST zones and to 4 AM in MST and PST zones. The path towards the South Pacific looks good on 40 meters between midnight and sunrise in MST and PST zones. Weakish openings to the Far East and Asia may be possible from the PST zone from midnight to sunrise. There's also the possibility of a 40 meter opening to Antarctica between 2 and 5 AM in EST and CST zones and between midnight and 5 AM in MST and PST zones. Eighty should open from ESTand CST zones to Europe, parts of Africa, and the Middle East until 2 AM, possibly for an hour or so longer in the EST zone. Eighty also looks good from PST and MST zones to the South Pacific from midnight almost to sunrise, and from the EST and CST zones from about 3 AM to almost sunrise. Check for good 80 meter openings to the Caribbean, Central America, and the northern countries of South America between midnight and 5 AM, and to 3 AM for deeper openings into South America, in all time zones. There's also a possibility of an opening to the Far East and Asia from the PST zone between 1 and 5 AM. Openings on 160 meters should be possible from the EST and CST zones to Europe between midnight and 2 AM. In PST zone check for 160 meter openings towards the South Pacific between 2 AM and sunrise. Openings towards the Caribbean, Central America, and the northern countries of South America should be possible from all time zones from about 2 AM to 4 AM.

Sunrise to Sunset: Check for possible 10 meter openings to Europe from EST and possibly CST zones between 9 and 11 AM, for openings to Africa between 9 AM and noon. Ten meter openings into South America should be possible between 9 AM and 3 PM from all time zones. Check for openings towards the South Pacific between 1 and 5 PM in PST zone, and possibly MST as well. Look for openings from PST zone to the Far East and Asia between 2 and 5 PM. Conditions may have to be at least High Normal for the 10 meter band to open. DX conditions on 15 meters should hold up well during the entire daylight period. Check for openings towards South America as early as 8 AM, with the band peaking in this direction between noon and 4 PM. Good openings are expected towards Africa between 10 AM and 2 PM in EST and CST zones, and until noon in MST and PST zones. Band should open to Europe from EST and CST zones between 8 AM, and noon, and until 10 AM in MSTand PST zones. Check for openings towards the South Pacific between 2 and 6 PM in all zones, with the band remaining open for an hour or so longer in PST zone. Fifteen meters may also open towards the Far East and Asia between 4 PM and sunset in PST and MST zones. Twenty meters should open to almost all areas of the world just after sunrise, and remain open with strong signal levels to at least 10 AM. From 10 AM through the early afternoon signals will probably weaken, with the band only open towards Europe, northern Africa, the Caribbean, Central America, the northern countries of South America and short openings towards the South Pacific. After 2 PM signals should begin to peak again on 20 meters towards Africa, and remain strong to 3 PM in the MST and PST zones, and to as late as 5 PM in the CST and EST zones. In the EST and CST zones, check also for long-path openings to Australasia between 3 and 5 PM, and look for short-path openings to Australasia from the PST and MST zones between 4 PM and sunset. Expect strong signal openings to all of Latin America from about 4 PM onward. Forty meters should

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Antennas—More antennas for new hams! Examples: a simple wire loop for 28 MHz and a copper 2-meter J-pole. Also, selected antenna Hints and Kinks.

Transceivers—Check out the new multiband QRP transceiver from Wayne Burdick, N6KR, and the NorCal QRP club: Operate 160 through 10 meters with plug-in band modules. Try a VLF transceiver (no license required!) or a QRP transmitter built from a single IC.

Filters—A new DSP filter from Dave Hershberger, W9GR, offers 18 different modes, including DTMF and CTCSS tone decoding.

Satellites—Learn about plans for the new Phase 3D bird. Build a "Junk Box" Satellite Receiver or a Mode-S Receive Converter.

Amplifiers—'96 is the year for 2-meter amplifiers: A new "brick" amplifier can boost an H-T to 25 or 50 W (builder's choice), and a 3CX1200Z7 provides 1.2 kW. Now that's talk power! For high-power buffs, there's a 3200-V, 2-A supply.

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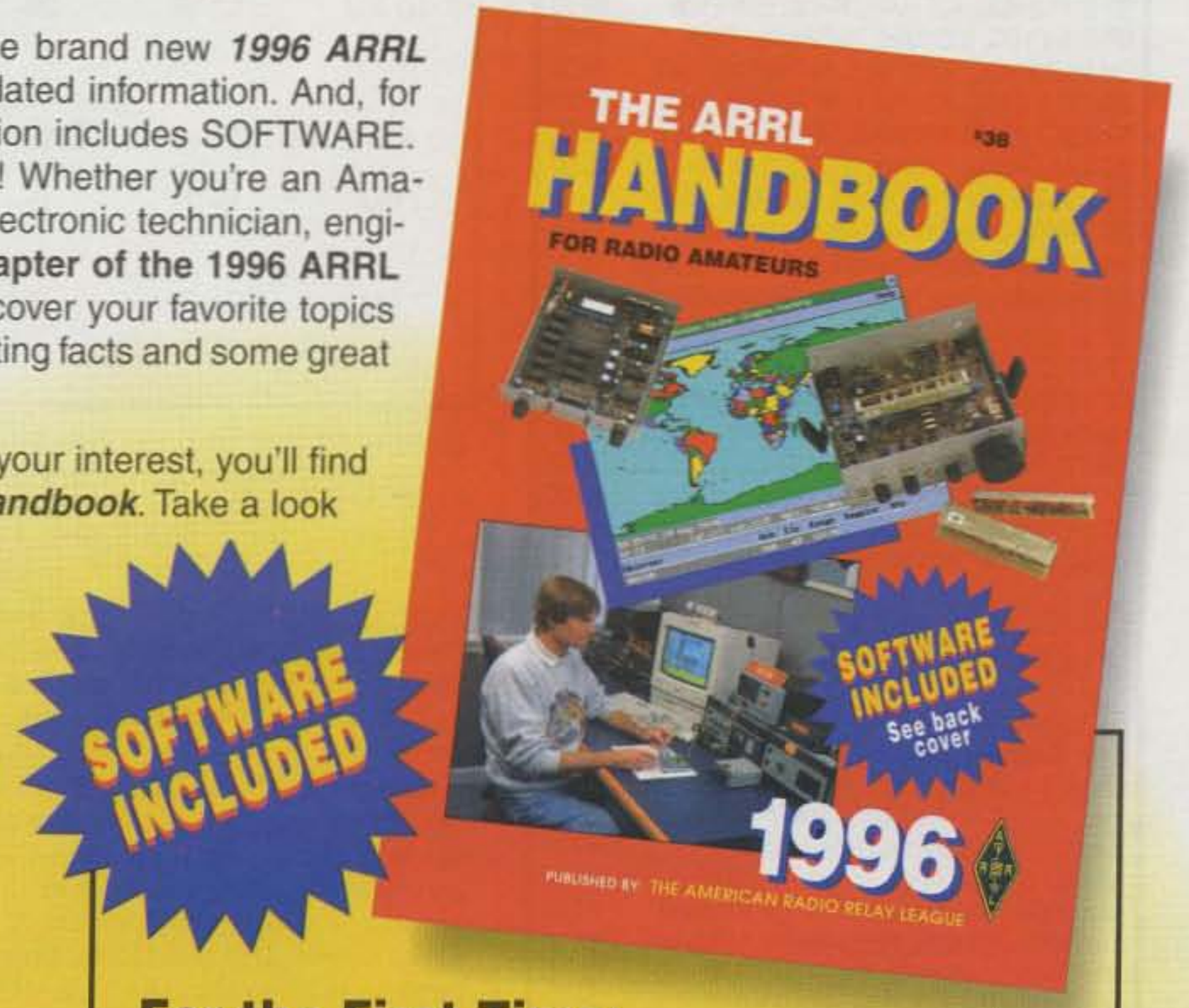

For the First Time: ARRL Handbook Software

This year's ***ARRL Handbook*** includes a 3.5-inch, 1.44-MB IBM compatible diskette with a variety of standalone applications and programs used with projects in the book.

TISFIND, a *Windows* application from the ARRL's Technical Information Service, provides you with the names and addresses of more than 900 Amateur Radio vendors and organizations. Your frustrating hunts for suppliers are history!

COILS, from Brian Beezley, K6STI, calculates the important characteristics of solenoidal coils.

ACTFIL is for designing active audio filters described in the Filters chapter.

The disk also features the software side of several projects in the book: an SSTV interface from Ben Vester, K3BC; a PC interface for sending CW from Ralph Taggart, WB8DQT; and a PC voltmeter from Paul Danzer, N1II.

Other software is useful for helping to find true North; for designing shortened, inductively loaded dipoles; and for designing Pi and Pi-L matching networks.

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Time EST	Time UTC	Meter Band	Areas To Which Openings Are Expected
7–10 PM	00-03	20	Southern Africa, Central & South Asia, SE Asia, Far East, South Pacific, New Zealand, Australasia, Central & South America, Antarctica
10 PM–1 AM	02-06	40, 80, 160	Europe, Africa, Central & South America
1–4 AM	06-10	40, 80	Europe, Central & South America, South Pacific, New Zealand, Australasia
4–7 AM	10-12	40, 80, 160	Central & South Asia, SE Asia, Far East, South Pacific, New Zealand, Australasia, Antarctica, Central America
7–10 AM	12-15	20	Europe, Africa, Central & South Asia, SE Asia, Far East, South Pacific, New Zealand, Australasia, Antarctica, Central & South America
10 AM–2 PM	15-19	10, 15, 20	Europe, Africa, Central & South America
2–4 PM	19-21	15	Africa, Central &South America, South Pacific, New Zealand, Australasia, Antarctica
4–7 PM	21-00	15	Central & South Asia, SE Asia, Far East, South Pacific, New Zealand, Australasia, Central & South America

Table I– Sample all-band operating schedule for Eastern QTH derived from DX Propagation Charts appearing in last month's column. Similar schedules can be derived for individual bands and time spans.

begin to open towards Europe and to the Caribbean, Central America, and the northern countries of South America about an hour or so before sunset in all time zones, but signals will be weakish.

Sunset to Midnight: Twenty meters is expected to hang in for an hour or so after sunset to parts of Africa from the EST and CST zones. In PST zone check for long-path openings to Europe and Africa on 20 beginning about 10 PM. The band looks good to most of Latin America to about 8 PM, and to Antarctica and the deep areas of South America almost to midnight. Twenty should remain open to the South Pacific to midnight, and to the Far East and Asia until 10 PM in all time zones, but openings favor MST and PST locations. Expect some fairly good openings on 40 meters to Europe and parts of Africa throughout this entire time period, and to most of Latin America as well. In PST zone, check 40 meters for openings towards the South Pacific beginning about 10 PM. Eighty meters should open towards Europe, Africa, the Caribbean, Central America, and the northern countries of South America during most of this time period. Check for possible 160 meter openings toward the Caribbean area and Central America, and possibly into northern South America, between 10 PM and midnight in all time zones. Openings may also be possible on 160 from the EST zone to Europe between 10 PM and midnight.

Remember that the contest period starts at 7 PM EST, Friday night, November 25, so be sure to use the sunset to midnight forecast to get started.

Short-Skip Charts

This month's column contains Short-Skip propagation data for use between distances of approximately 50 and 2300 miles, and between the states of Alaska and Hawaii and the Continental area of the USA. Instructions for using this information are given elsewhere in this column.

CW Contest Work Plan

Table I is a sample work chart for the CW Contest section. It was devised from the DX Propagation Charts which appeared in last month's column. This particular example is for multiband operation in the EST zone. Similar work charts can be devised for other bands, for other operating conditions, and for other time zones.

VHF Ionospheric Openings

Two short but significant meteor showers are expected during November, which should make possible some meteor-scatter-type openings on the VHF bands. The *Taurids* shower, occurring during the first week of November, should peak between the 2nd and 4th, with a count of about 15 meteors an hour. A second shower of about the same intensity, called the *Leonids*, should begin on November 15th and peak on the 16th.

Some auroral VHF ionospheric openings should be possible during November, especially when HF conditions are Below Normal or Disturbed as a result of a radio storm. Check the Last-Minute Forecast at the beginning of this column for the days during November that are most likely to be in these categories.

Despite low sunspot activity, this can still be a good contest period, but it will require more operating skill and patience than during the previous years of higher sunspot count.

Good luck on the WW DX CW Contest weekend. Be sure to let me know how these special contest propagation forecasts work out. For the past 45 years the contest forecasts have held up with an accuracy better than 90%.

73, George, W3ASK

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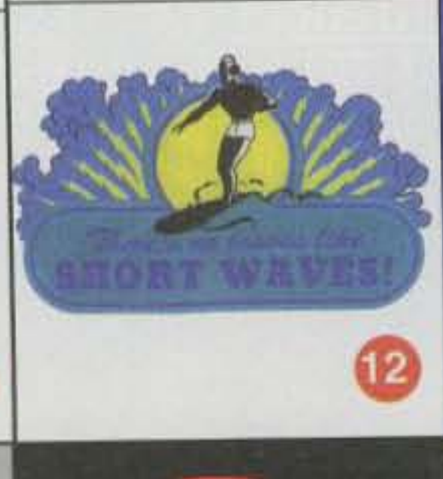

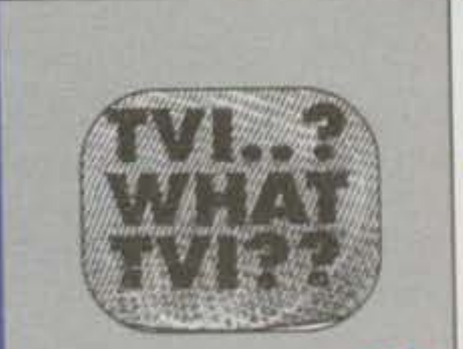

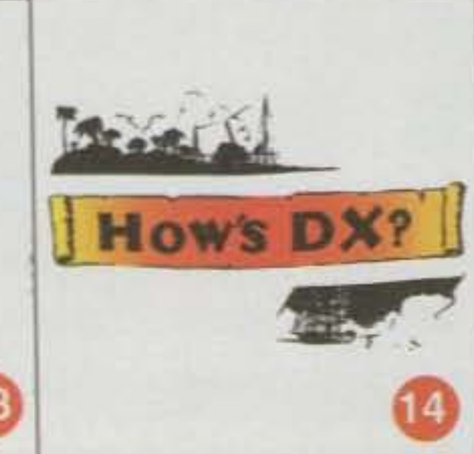

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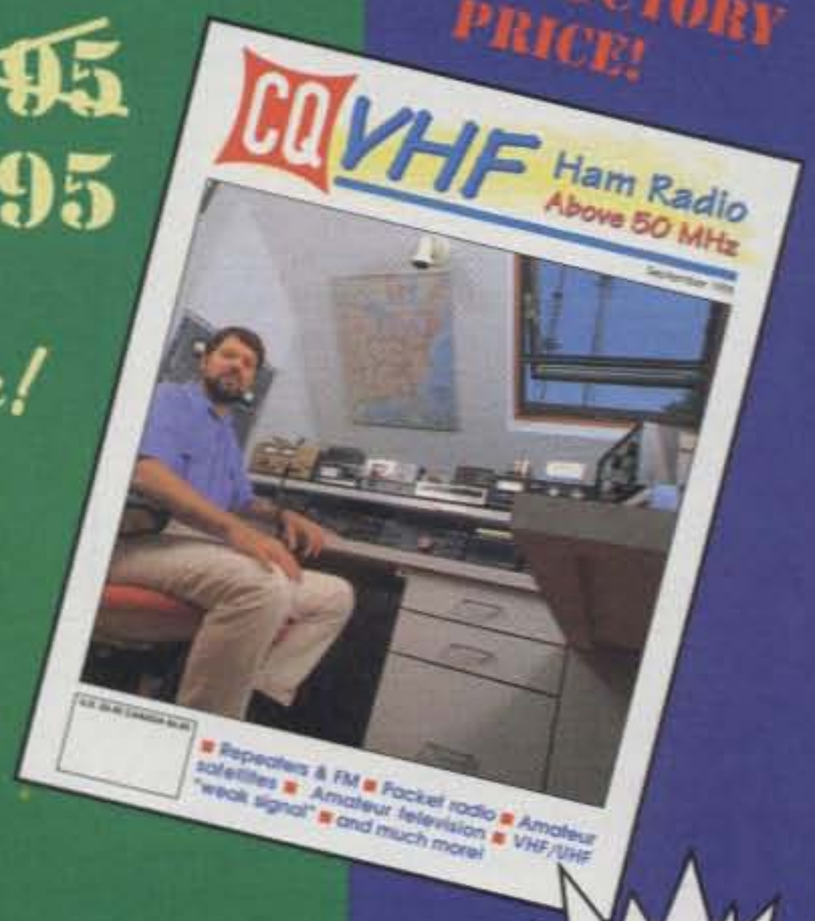

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QRP Transceiver

(from page 22)

shows that it's a lot easier and cheaper to use general-purpose boards in these types of projects. With general-purpose boards you have flexibility to make changes, and you are not kept to a fixed circuit arrangement.

This design needed four general-purpose PC boards, Archer Experimenter part #276-170, to mount all parts. These boards, available from Radio Shack, are ideal for either digital or analog circuits. Parts insert into the board top (bare) side and solder on the foil side. The foil etched pattern connects rows of five holes on either side of the center. It also has two long bus-rows on the edges. Ideally, you breadboard each stage on a solderless socket and check its operation. You then solder it to the board one stage at a time.

The assembled boards mount on a chassis made from double-clad PC material. Using copper-clad PC material for a chassis adds a degree of flexibility to your project. It lets you solder shields or tie points where needed. The soldered in place shields add stiffness to the final assembly.

To protect the oscillators, I installed shields between and around these stages. I reinforced the VFO section with two small PC-board sections underneath the main chassis to stiffen the entire region around the tuning capacitor and oscillator circuits. The variable capacitor uses an external vernier drive. The VFO tunes about 105 kHz. With an 8:1 reduction, each capacitor-shaft revolution equals about 25 kHz or 14 degrees per kHz. This will give excellent bandspread and station selectivity.

The receiver RF-stages, including the detector, need one complete board. Another board mounts the audio and TR-switching circuits. The transmitter and relay circuits mount on a fourth board located near the rear panel. For the foil strip grounds shown in fig. 3, I used K&S[2] #254 Easy Solder Tin Sheet. I also use this foil to reinforce other ground areas to act as shields. The material is very thin, forms easily, and solders to the PC-board chassis.

I also built the front and rear panels from double-clad PC material. There are several advantages to using PC material for a chassis. First, the material is strong and light weight.

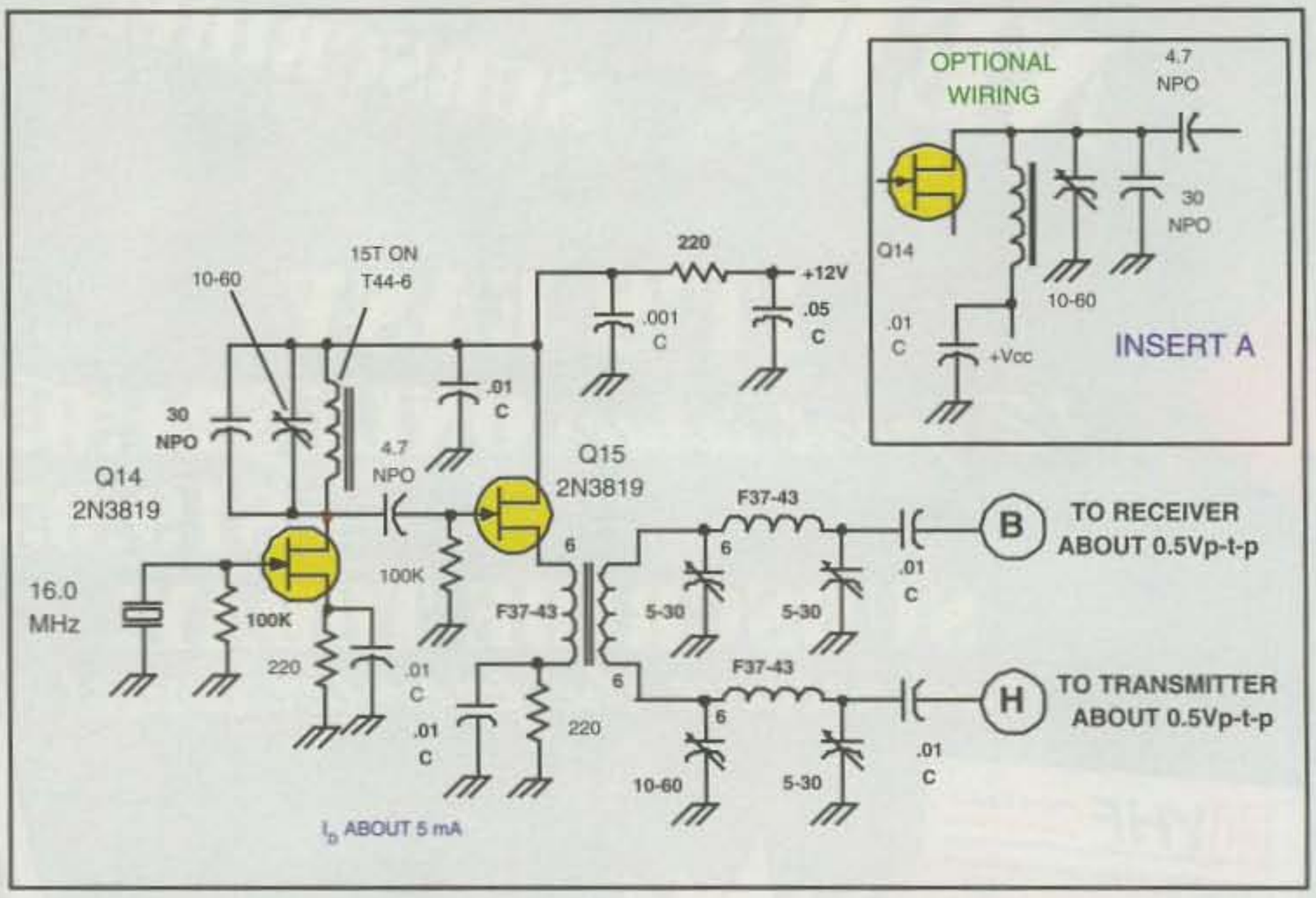

Fig. 7– Schematic diagram of the HFO.

Second, it forms very easily with normal "shack" hand tools; that's a big plus.

The front-panel decal is a computer-generated layout printed on plain paper, multi-coated with Krylon, and glued to the panel face. A piece of smoke-colored plastic gives the front panel a decorative touch. The outer top cover is a formed piece of aluminum.

To simplify wiring and reduce assembly size, I favor 30-gauge solid wire for interconnections. Except for the transmitter output stage, there is very little current in these circuits. Also, small-diameter coaxes or twisted pairs help keep your assembly neat. Both the small coax and 30-gauge wires need a little extra preparation time, but the results are worth the effort.

Don't Wait To Start Testing

Don't wait until you get to the end to start testing and alignment. Start testing as you build and install each stage onto the general-purpose boards. As you assemble and test a stage, you can align it. Then when you finish construction, you already have debugged each stage, prealigned it, and now it's only a matter of peaking the circuits.

For peak receiver alignment, use a stable 0.25 microvolt source. You should have a visible detected audio signal with an antenna signal under 0.1 microvolts. The overall receiver S+N/N should be about 10 dB, with a 0.25 microvolt antenna signal.

The transmitter alignment is easy, but to start, disconnect the +12V source to the output stage, Q5. Adjust the Q3 level for about 0.5V P-T-P and then align the two mixer stages. I set these by peaking for maximum signal on the base of Q5. Then you can connect the source voltage and a dummy load and align the transmitter output stage.

The output stage operates class C, and the power delivered to an R3 antenna at this station exceeded 1.4 watts. One advantage of high-gain transistors is they have a large output for low drive levels. This means it's easy to damage these devices with poor loading; you

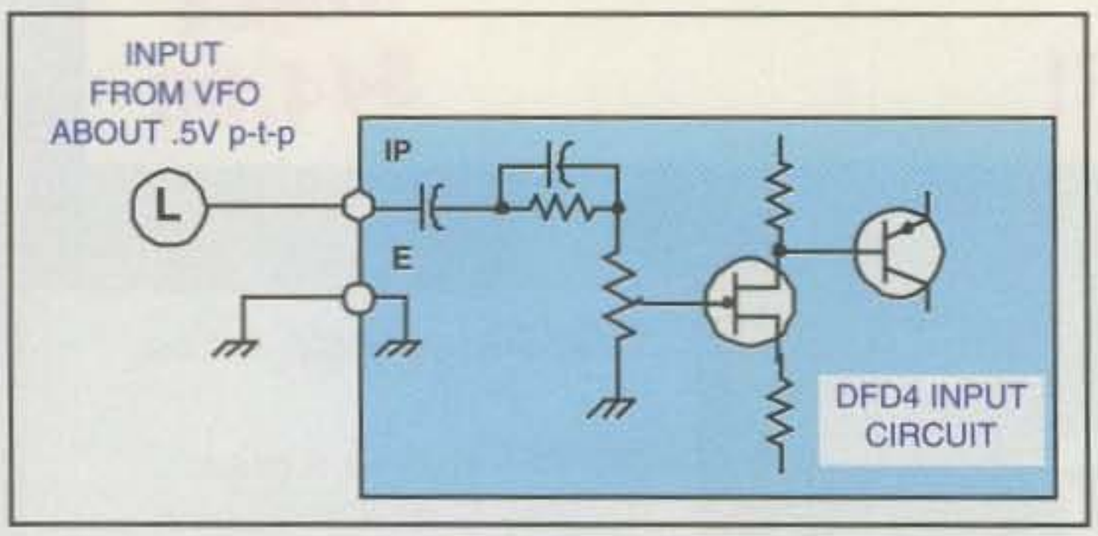

Fig. 8– Schematic diagram of the VFO to Howes DFD4 counter interface.

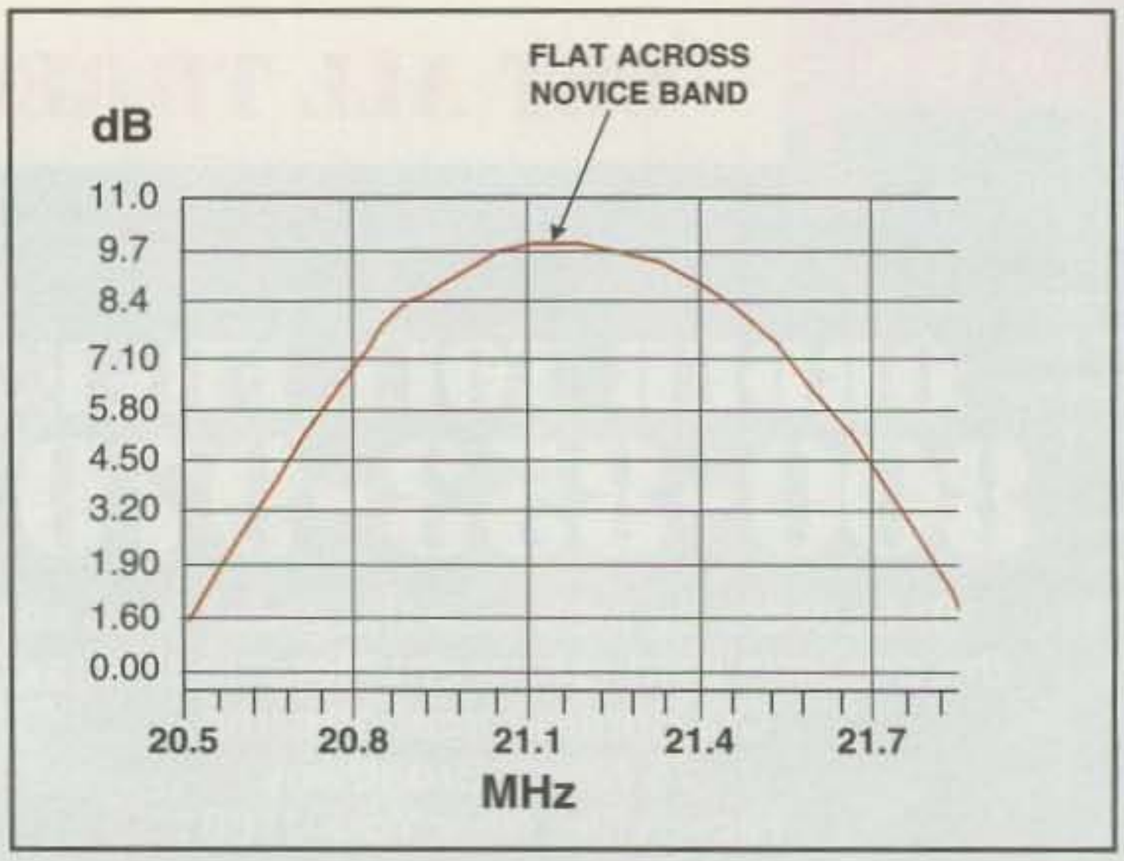

Fig. 9– Q1 stage voltage gain.

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8 NOTCH TRACKING • Once tuned, the IF notch filter will track the offending heterodyne (±10 Khz) if the VFO frequency is changed.

9 DDS PHASE LOCK LOOP SYSTEM • A single-crystal Direct Digital Synthesis system is utilized for very low phase noise.

10 CW FEATURES • Full break-in operation, variable CW pitch. built in electronic keyer up to 60 wpm.

11 DUAL VFOs • Two separate VFOs for split-frequency operation. Memory registers store most recent VFO frequency, mode, bandwidth and other important parameters for each band.

12 200 MEMORIES • Memory capacity of 200 channels, each of which store frequency, mode, AGC and bandwidth.

13 COMPUTER INTERFACE • Built-in RS-232C interface for advanced computer applications.

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should pre-tune the output stage before applying drive and DC power. When you tune your amplifier, slowly increase the drive power and DC voltage. If the circuit remains stable under full power, slightly back-off the first pi-output capacitance. Set the first tuning capacitor at slightly less capacitance than it would be at peak power. This will help to keep your amplifier stable over the tuning range.

Add A Digital Frequency Readout

Including a digital counter in your project for tuning during skip openings and schedules is essential. You need to know where you are tuning when working to specified frequencies and time. To meet this need, the design incorporates a Howes[3] DFD4 digital counter that displays the exact tuned frequency. The counter works by counting the VFO and displaying data in the format **.125.3**, meaning 125.3 kHz. The rest simply "spills off" the counter. Small internal jumpers program the counter to offset the VFO count start point and display the actual tuned frequency.

There are several inexpensive programmable digital counter kits available. The two I recommend are the CCI model No. TK-1 and C. M. Howes model No. DFD4. The DFD4 advantages are low panel height, built-in 5V regulator, and small clock pulse. It is available as a kit with all parts or fully assembled. The TK-1[4] requires more front-panel space, needs a separate 5V regulator, and generates a strong clock pulse, which (without extra filtering and shielding) can affect the receiver audio. The TK-1 is not available as a complete kit, but is available either fully assembled or as an empty PC board with complete instructions; you furnish the parts. All TK-1 parts are available from OSE.[5] The instructions in both units completely describe how to assemble, test, and program the counter. In both cases they start counting at some value other than zero so the display coincides with the tuned frequency. Both the Howes and CCI counters are very simple and require about one evening to build.

Fig. 8 shows where the VFO joins the Howes counter. In this unit I set the Howes counter offset or count start at **844.9** counts for a **.100.0** display at 21.1 MHz.

Some Notes

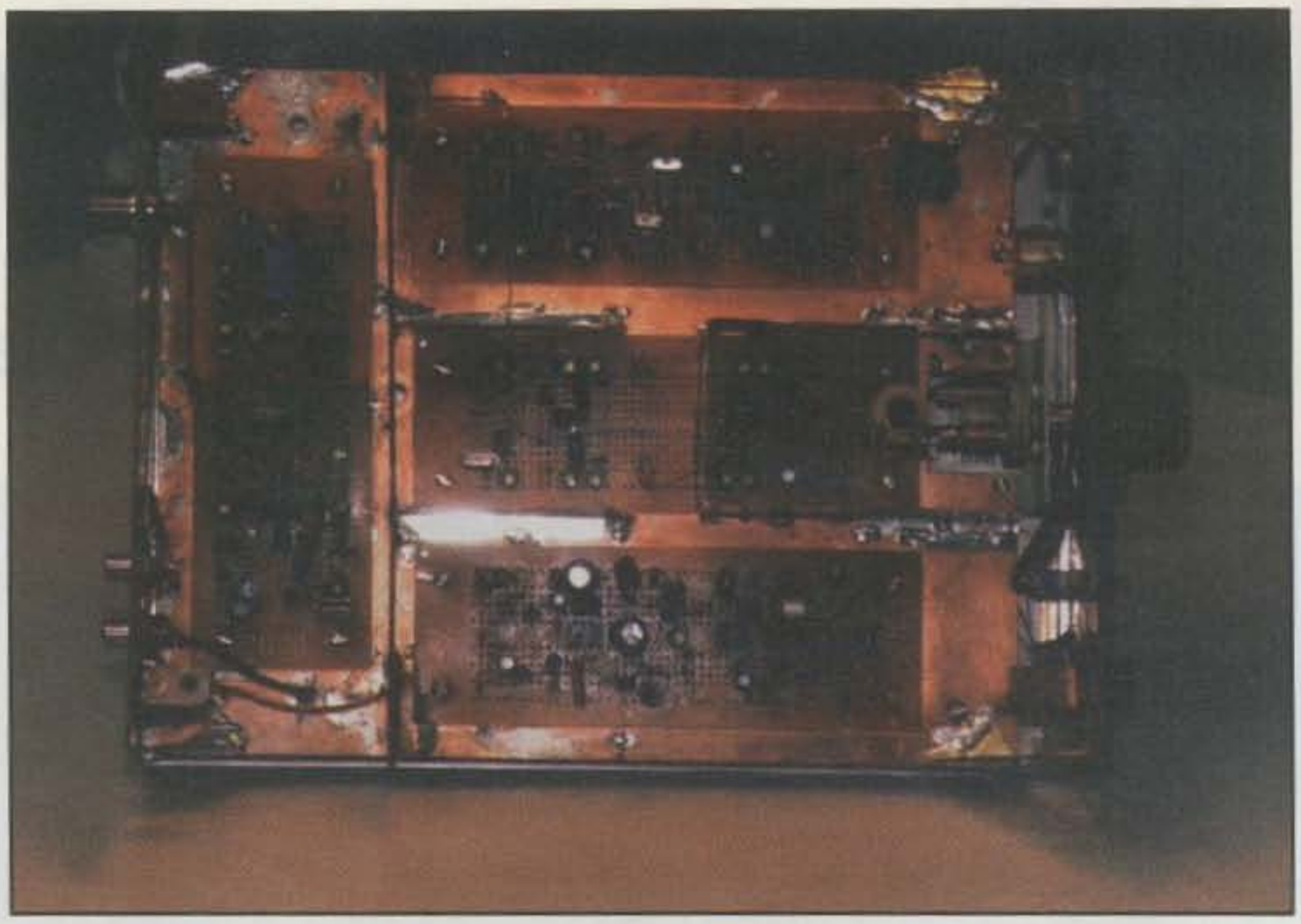
1. The toroids and VFO solenoid coils are wound with AWG No. 28 wire.

2. The capacitor codes are : MF = Metal Film; C = Ceramic; P = Polystyrene; NPO = Negative, Positive, Zero. NPO is a characteristic often specified for RF circuits requiring good temperature stability. You will sometimes run across capacitors marked "CG0"; that is a good substitute.

3. A good source for inexpensive matched crystal sets is Dan's Small Parts and Kits, 1935 S. Third West #1, Missoula, MT 59801 (1-406-543-2872).

Footnotes

1. "Designing and Building Simple Crystal Filters," by Wes Hayward, W7ZOI, *QST*, July 1987, p. 24.



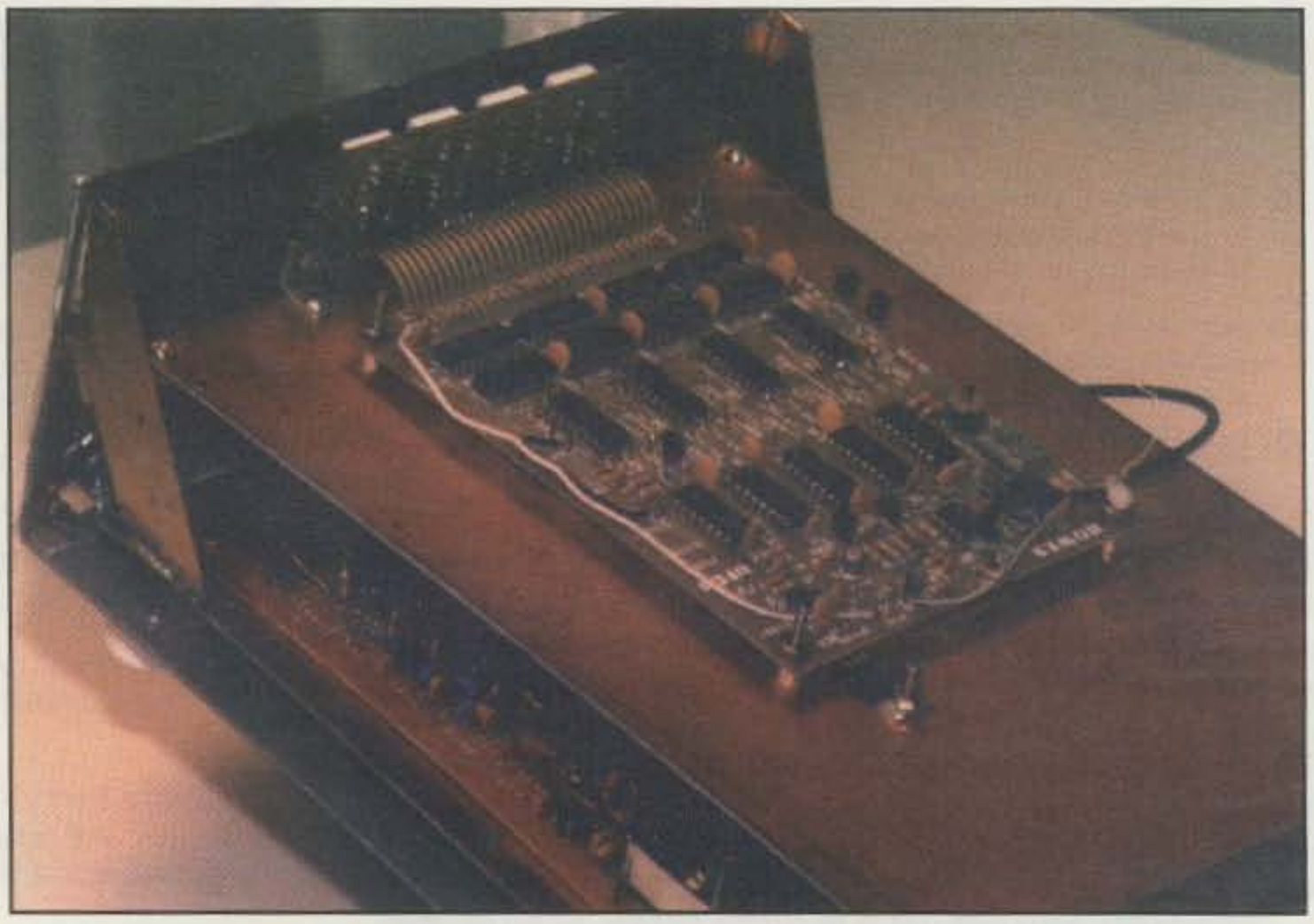
Chassis viewed from the top with the digital counter removed. The board on the bottom is the audio filter, preamp, and PA with the sidetone oscillator and shaped keyer circuit. The board in the middle has the VFO on the right behind the front panel, and then the HFO circuits. The board on the top is the receiver board. The RF stage is on the left end and the detector L/C filter is on the right end. The transmitter board is in the small cavity on the back of the chassis. The crystal oscillator is on the bottom, followed by the buffer and output PA stage.

2. K&S Engineering, 6917 West 59th St., Chicago, IL 60638 (1-312-586-8503). If you write or call, they will send you a list of local hobby shops that carry their products.

3. The Howes counter kit is available from Townsend Electronics, Inc., P.O. Box 415, Pierceton, IN 46562 (1-219-594-3661, or FAX 1-219-594-5580).

4. The PC-board set (three parts) and counter assembly instruction packet are available from Communications Concepts, Inc., 508 Millstone Drive, Xenia, OH 45385 (1-513-426-8600).

5. Ocean State Electronics, P.O. Box 1458, 6 Industrial Drive, Westerly, RI 02891 (1-800-866-6626). ■



Chassis viewed from the top-back showing how the digital counter is installed. The RF circuits are mounted on another copper-clad PC board underneath the counter assembly. Soldered brackets between the lower chassis and the panel help to stiffen the entire assembly. The counter chassis mounts to small copper "L" pieces soldered to the back side of the front and rear panels.

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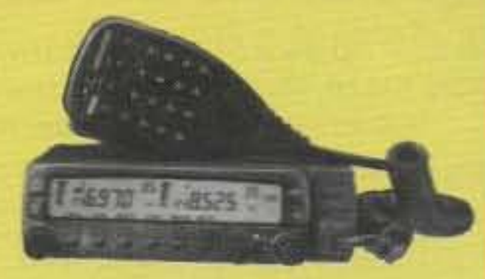

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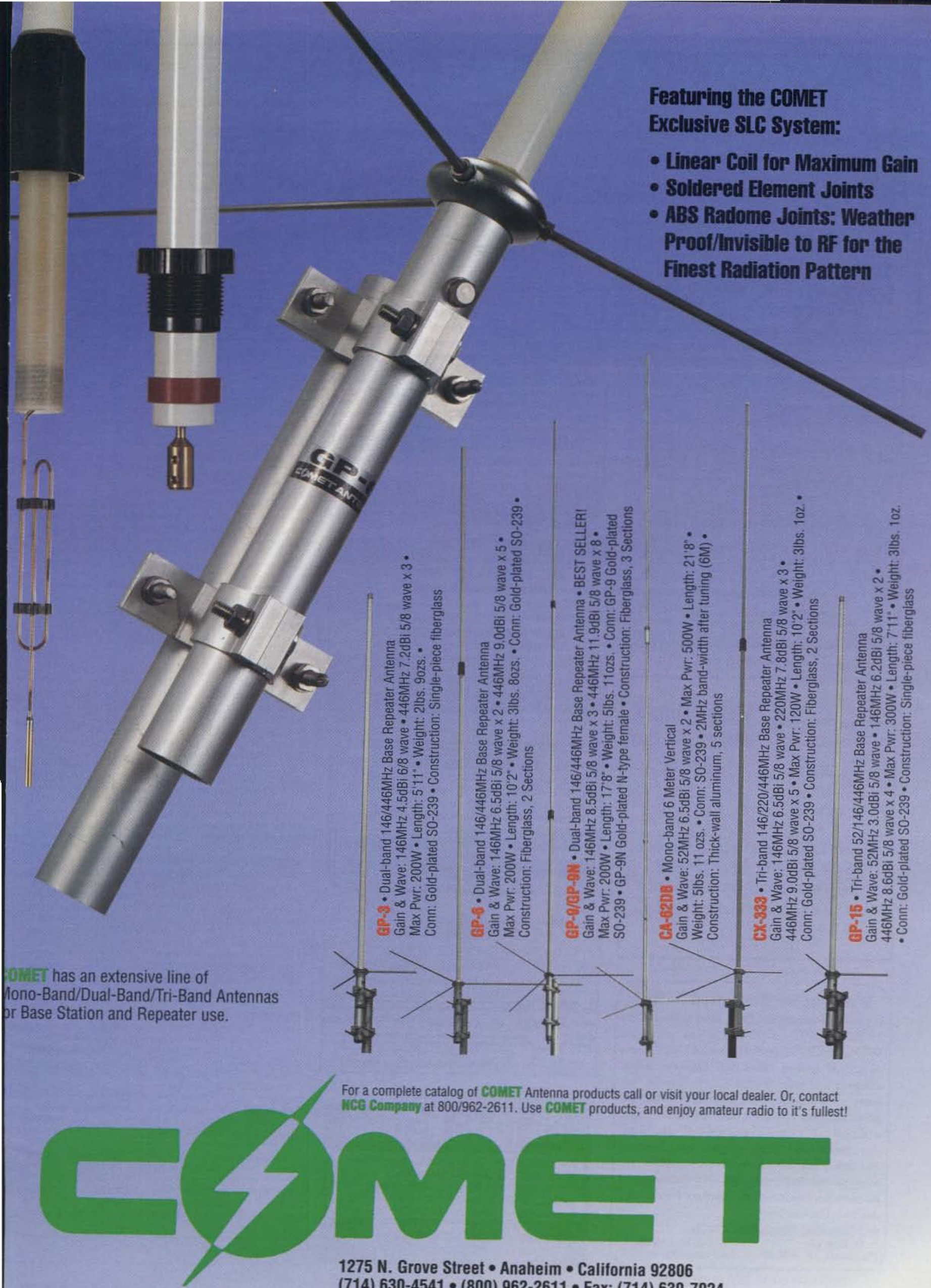

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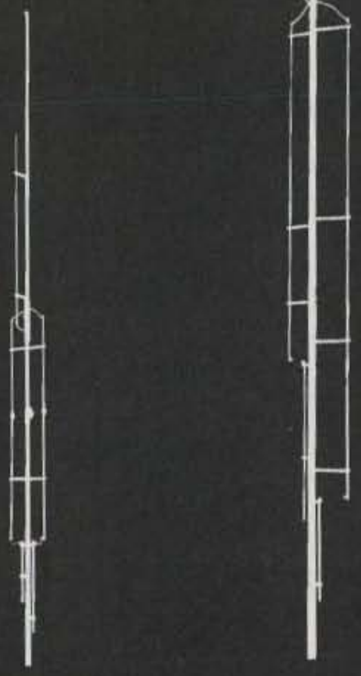
Eagle DX



Challenger DX

Voyager DX

This chart helps you select the right GAP antenna. When comparing GAPs, bandwidth is not a concern. With few exceptions, a GAP yields continuous coverage under 2:1 for the **ENTIRE BAND**.

All antennas utilize a GAP elevated asymmetric feed. A major benefit is the virtual elimination of the earth loss, so more RF radiates into the air instead of the ground. This feed is why a GAP requires **NO RADIALS**. Just as elevating a GAP offers no significant improvement to its performance, adding radials won't either, making set up a breeze.

A GAP antenna has no traps, coils or transformers. This is important. The greatest sources of failure in multiband antennas are these devices. Perhaps you heard someone discuss a trap that had melted, arced or became full of water. Improvements to these inherent problems are the focus of the antenna manufacturer, while the basic design of the antenna remains unchanged. **GAP improved the trap by eliminating it!** Removing these devices means they don't have to be tuned and, more importantly, won't be detuned by the first ice or rain. The absence of these devices improves antenna reliability, stability and increases bandwidth.

Another major advantage to a GAP antenna is its NO tune feature. Screws are simply inserted into predrilled holes with a supplied nutdriver.

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Worldradio – "These guys have solved the problem associated with verticals. That is, an awful lot of RF is wallowing around and dropping into the dirt instead of going outward bound. A half-wave vertical does need radials if it is end fed (at the bottom). But the same half-wave vertical does not (as much, hardly at all) if is fed in the center."

IEEE–"Near field and power density analyses show another advantage of this antenna (asymmetric vertical dipole): it decreases the power density close to the ground, and so avoids power dissipation in the soil below it. The input impedance is very stable and almost independent of ground conductivity. This antenna can operate with high radiation efficiency in the MF AM standard broadcast band, without the classical buried ground plane, so as to yield easier installation and maintenance."

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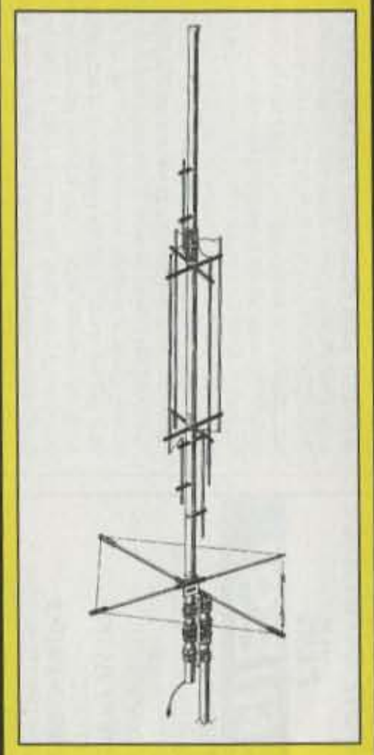

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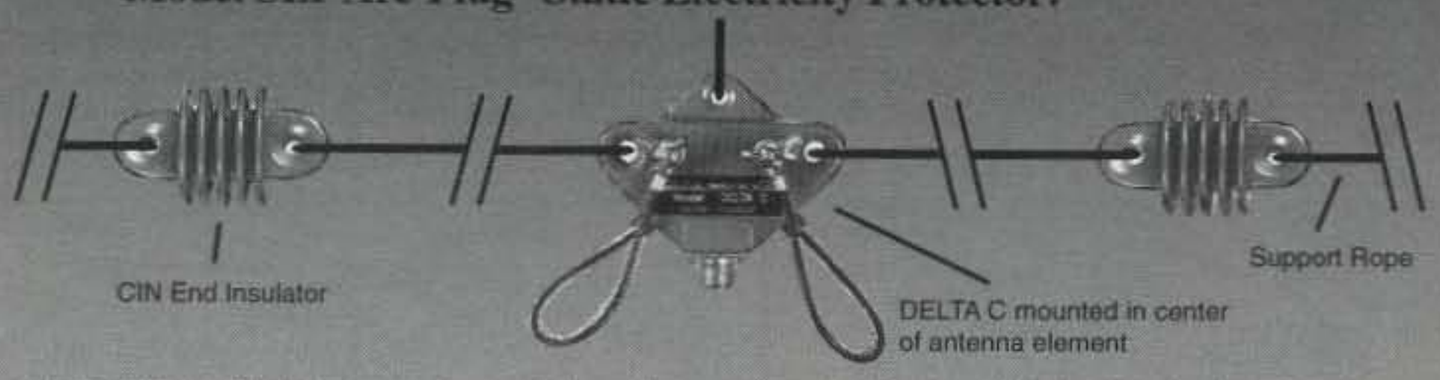

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(continued on page 151)

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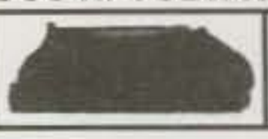

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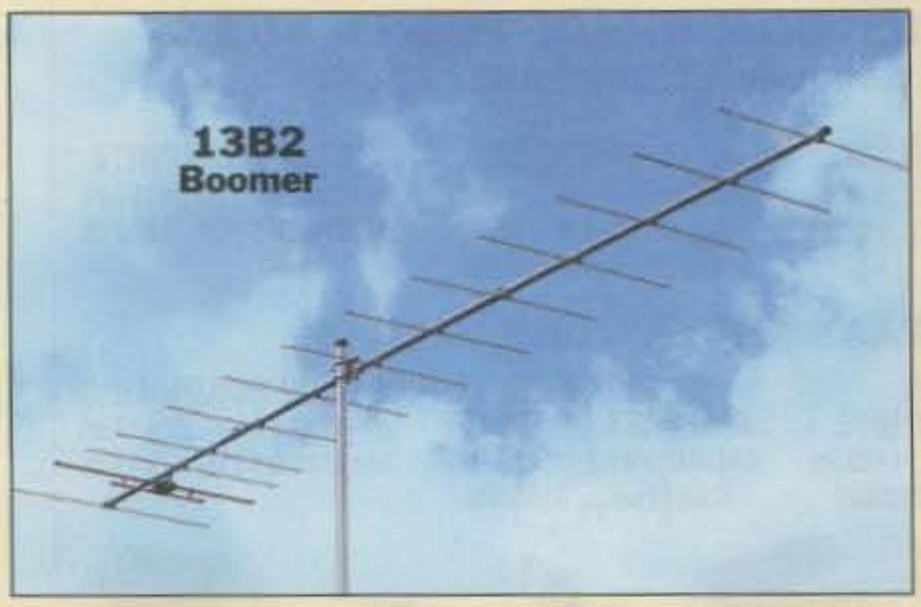
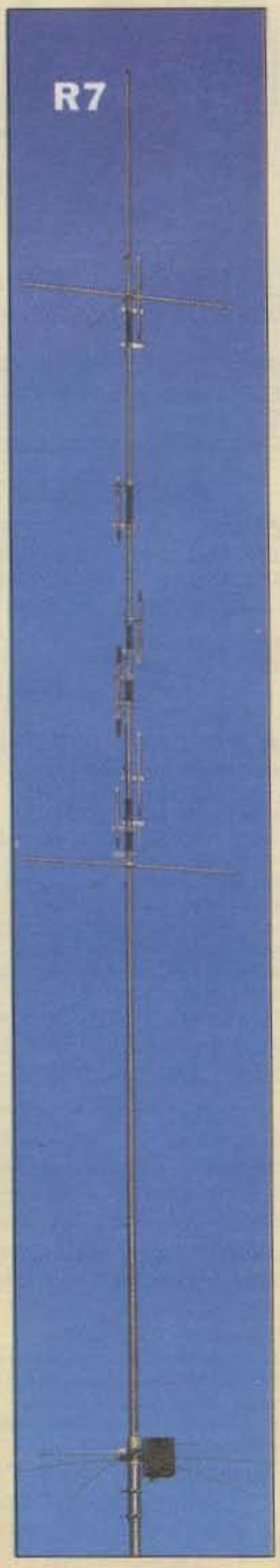
Cushcraft is the leader in new and innovative antenna designs to make your amateur radio operation more satisfying. Whether you are new to the hobby or have many years of experience there is a Cushcraft antenna for you. Call or visit your local dealer. He has Cushcraft antennas in stock.

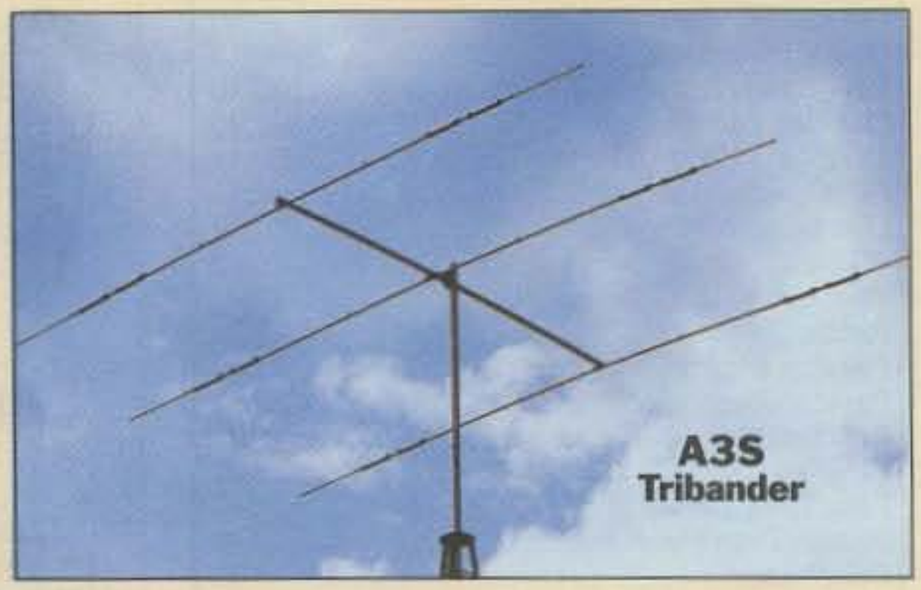


BOOMERS. The contest winning ***17B2*** for EME, Tropo, SSB, CW or the ***13B2*** for FM, Packet or SSB over the whole 2 meter band. Both models have the new UltraMatch balanced feed system. Computer aided design gives you the cleanest pattern and the highest gain available

PERFORMANCE AND VALUE LEADERS. Our newest computer optimized 2 meter Yagis. ***A148-3S***, a 3 element compact for Packet, FM or even portable use. Easily rear mounted. ***A148-10S*** is one of our best value designs with excellent gain and front-to-back. Great for FM or full band 2 meter operation.



SKYWALKER MONOBANDERS.
10, 15, 20 and 40 meter Yagis for more contacts, less waiting and a better signal. Preferred by contesters and DX-peditions worldwide.



HF TRIBAND BEAMS. ***A3S*** - The most popular compact 10, 15, 20 meter beam. ***A4S*** - A high performance 18' long wideband beam. Both models come with stainless steel hardware and have optional 40 meter add-on kits.

Dual Band Mobile. ***CS-270M*** - Designed for durability and great performance.

Dual Band Ringos. ***AR-270*** - Only 45 inches tall! A must for the new dual band transceivers covering 70 cm and 2m. ***AR-270B*** - This new dual band features high gain with a low angle of radiation and stands only 7.7 feet tall. ***ARX-270U/N*** - High performance, 16.5 foot, fiberglass with exceptional gain. Three piece construction assembles in minutes.

R7 **10, 12, 15, 17, 20, 30 & 40 METERS HALFWAVE VERTICALS**
Amateur radio's most popular vertical design now gives you 7 band performance including 30 & 40 meters, without ground radials. Only 22 feet tall, R7's small footprint and ground independence give you "mount anywhere" flexibility. R5, with the same great features as the R7, covers 10, 12, 15, 17 and 20 meters.

RINGO RANGER II. Still the worlds favorite 2 meter, 70 cm or 220 MHz omni antenna, with more gain. A must for your FM or packet station. Models: ***ARX-2B, ARX-220B, ARX-450B, ARX-450BN***

AVAILABLE THROUGH DEALERS WORLDWIDE

P.O. Box 4680, 48 Perimeter Road, Manchester, NH 03108 USA • Telephone: 603-627-7877 • FAX: 603-627-1764

YAESU

HOLIDAY SPECIALS

$200.off

FT-1000/D

FT-990/DC

$25.off

G-2800SDX
G-1000SDX
G-800SDX
G-800S

$70.off

FT-530

$50.off

FT-900/AT
(Includes YSK-900 Remote Kit)

FT-840

GOOD OCT. 14 1995 THROUGH JAN. 6 1996

FT-2200

FT-5200

$40.off

$30.off

FT-11R
FT-41R
FT-51R

FT-5100

FT-8500

FT-2500

CUSTOMER: Surrender this coupon at time of purchase to your authorized Yaesu dealer for immediate discount. Limit one coupon per purchase. Coupon is non-transferable and can be only used for products as advertised in this ad and for the discounts as stated. Offers only good at authorized U.S. and Canadian Yaesu dealers.
DEALER: Send this coupon along with a copy of sales receipt to YAESU U.S.A., Sales Dept., 17210 Edwards Rd., Cerritos, CA 90703.

CHECK BOX(ES)

- ☐ $200 OFF FT-1000/D, FT-990/DC
- ☐ $ 70 OFF FT-530
- ☐ $ 50 OFF FT-900/AT, FT-840
- ☐ $ 40 OFF FT-5200, FT-2200
- ☐ $ 30 OFF FT-8500, FT-5100, FT-2500, FT-11R, FT-41R, FT-51R
- ☐ $ 25 OFF FT-G-2800SDX, G-1000SDX, G-800SDX, G-800S

PURCHASE DATE: _____

DEALER NAME/STATE: _____

DEALER SIGNATURE: _____

Offer void where prohibited by law. Coupon has no cash value. Limit one coupon per purchase. Not valid with any other Yaesu offers or discounts. Offers not applicable to purchases made prior to October 14, 1995 or after January 6, 1996.

COUPON VALID FOR PURCHASES MADE BETWEEN OCT. 14, 1995 AND JAN. 6, 1996

NEW! ADMS-1B PC Software. Program Freqs, Alpha Names, Auto-Dial Slots. At dealers now!

Dual Band Handheld FT-51R

$20 OFF SEE YOUR DEALER FOR DETAILS LIMITED TIME OFFER.

Only one Dial/Volume knob required for easier use.

The First Dual Band HT with WINDOWS!

Three dual receive configurations VHF/VHF, UHF/UHF, or VHF/UHF with main band frequency on right or left side. Flexible programming allows transmit on main or sub band.

An 8 character alpha-numeric user help menu scrolls operation instructions in the bottom of the large, backlit display.

Digital battery voltage readout displays condition of battery in use. Scan skip function allows individual memory channel lock-out during scanning mode.

Spectrascope™ displays active adjacent frequencies in real time with relative signal strength.

MH-29A2B LCD Display Mic with Remote Functions. (Optional)

The new FT-51R Dual Band HT is state-of-the-art, and easy to use! So easy, you won't need an operating manual. Its exclusive, scrolling instruction menu located in the large, backlit display "window", guides you through total operation while simultaneously viewing the main display window.

You'll like some of the other new, exclusive features, too. Like Spectrascope.™ This unique feature displays real time, continuous scanning of activity on adjacent frequencies in VFO mode or 8 of your favorite memories. A cloning feature duplicates favorite channels to another FT-51R.

A digital battery voltage display, five power output levels, the largest backlit dual band HT keypad made, Smart Mute,™ two VFOs on both VHF and UHF, as well as available 2 Watt and 5 Watt versions, round out the exciting FT-51R. Plus, the optional MH-29A2B Display Microphone allows you to control volume and also access Memory, VFO, Call Channel, Band Selection and scanning functions. All of this in world's smallest dual band HT radio!

See the FT-51R with "windows" at your Yaesu dealer today!

"I can see two frequencies and alpha-numeric all at the same time."

"Scrolling instructions tell me what to do next!"

"I use the Spectrascope to find new contacts faster."

"Yaesu did it again!"

FT-51R
2¼"W x 4¼"H x 1⅛"D
(2 Watt version shown.)

Specifications

- Frequency Coverage
  VHF RX: 110-180 MHz
  TX: 144-148 MHz
  UHF RX: 420-470 MHz
  TX: 430-450 MHz
- Spectrascope™ Display
- Scrolling User Help Menu
- Alpha-Numeric 8 Character Display
- Up/Down Volume/Squelch Controls & Display
- Selectable Sub-Band TX Mute
- Automatic Tone Search (ATS)
- Digital Battery Voltage Display
- AM Aircraft Receive
- Scanning Light System (SLS)
- 120 Memory Channels (80 w/Alpha-Numeric)
- Large Backlit Keypad & Display
- Automatic Repeater Shift (ARS)
- Multiple Scanning Modes
- 3 Selectable Scan Stop Modes with Scan Skip
- User selectable lock function w/15 combinations
- Automatic Power Off (APO)
- TX/RX Battery Savers Built-in
- Handy Cloning Feature
- 5 Selectable Power Output Levels
- Message system with CW ID
- Selectable RX Smart Mute™
- Cross-Band & One-Way Repeat Functions
- DTMF Paging/Coded Squelch Built-in

Accessories
Consult your local dealer.

YAESU
Performance without compromise.™

Specifications subject to change without notice. Specifications guaranteed only within amateur bands.
Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.

EDSP RX/TX

All-Mode HF Transceiver

FT-1000MP

The year was 1956. Electronic communication throughout the world was on the threshold of significant and remarkable change. Intrigued by the development of single-sideband radio theory, a young engineer and amateur radio experimenter painstakingly assembled an SSB transmitter. Word of his successful efforts spread quickly among his friends, and soon radio amateurs from all over the country were requesting transmitters just like it. Thus was born the first invention of JA1MP, founder of Yaesu. Though his key is now silent, in tribute to his leadership and exceptional contributions to the radio art, the FT-1000MP carries the memory of his call sign.

An HF Masterpiece, Combining the Best of Digital and RF design technology. The FT-1000MP.

Specifications

- EDSP (Enhanced Digital Signal Processing)
- Shuttle-jog Rapid Tuning Enhancement
- Directional Tuning Scale for CW/Digital mode and clarifier offset display
- Dual In-Band Receive w/ Separate S-Meters
- Selectable Antenna Jacks
- Collins SSB Mechanical Filter built-in, 500 Hz CW Collins filter plug-in, optional
- Selectable Cascaded Crystal and Mechanical IF Filtering (2nd and 3rd IF Filters)
- User-programmable Tuning Steps w/0.625 Hz High Resolution Low-Noise DDS Circuit
- Custom Feature Set-up via New Menu System
- Adjustable TX Output Power: 5-100W (5-25W AM)
- True Base Station: Both 100-117 or 200-234± VAC 10%, 50/60 Hz and 13.5 VDC Power Inputs

Blending digital and RF technology, the FT-1000MP features a Yaesu exclusive: Enhanced Digital Signal Processing (EDSP). Beginning on the receive side with Yaesu's industry-standard high-intercept front end design, the RF signal is then fed to the IF stages, where an impressive array of 8.2 MHz and 455 kHz IF filters (including a built-in Collins SSB Mechanical Filter) establish the tight shape factor so important in obtaining high dynamic range and low noise figure. Finally, the EDSP system provides specially-designed filter selections and response contours for maximum intelligence recovery.

Only with this combination of EDSP, independently selectable 8.2 MHz and 455 kHz IF filters, and a low-noise DDS local oscillator system can receiver performance without compromise be obtained. You can customize your FT-1000MP by choosing from 20 kHz, 500 Hz, and 250 Hz optional, cascaded IF filters, then zero in on weak signals using Yaesu's exclusive Shuttle-jog Rapid Tuning Enhancement and high-resolution (0625 Hz) DDS VFO. Without question, the FT-1000MP is the most technologically advanced HF rig today.

EDSP operates in both transmit *and* receive modes. On receive, the EDSP produces enhanced signal-to-noise ratio and significantly improved intelligence recovery during difficult situations involving noise and/or interference. The result of hundreds of hours of laboratory and real-world experimentation, EDSP's 4 preset random noise reduction protocols and 4 digital filtering selections are controlled by easy-to-use concentric controls on the front panel of the transceiver. High, low, and mid-range cuts for voice work are teamed with razor-sharp CW bandpass filters and an automatic notch filter which identifies and attenuates undesired carriers or heterodynes. Also operational in the transmit mode, EDSP provides 4 performance-enhancement pattern selections for different operating circumstances, ensuring best readability of *your* signal on the other end of the path.

Once again, Yaesu's engineers have reaffirmed the vision and dedication of JA1MP which began nearly 40 years ago. See the incomparable FT-1000MP today.

YAESU

Choice of the World's top DX'ers

FT-1000/D
Legendary 200W
All Mode HF Transceiver
"The Dream Station"

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ONLY $1,560.00! manufacturer's suggested retail price*

IC-706 • HF + 6M + 2M! • ALL MODES!

- Powerful 100 W from HF to 50 MHz and 10 W for 144 MHz
- 101 memory channels with dotmatrix display
- All mode including SSB, CW, RTTY, AM and FM.

The front panel photo is **Actual size.**

Detachable front panel mounts any where.

Super compact at 6 9/16(W) × 2 1/4(H) × 7 7/8(D) in

Full functions to compete with big rigs

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